INTERNATIONAL LABOUR OFFICE
CENTRAL LIBRARY AND
DOCUMENTATION BRANCH

AGRICULTURAL DEVELOPMENT PROPOSALS

1966-1970

Ceylon

Published by the Ministry of Planning and Economic Affairs -66

PREPARED BY THE MINISTRY OF AGRICULTURE AND FOOD

20 MAR 1967

02869

13600

PREFACE

THE Government is now engaged in the preparation of programmes of development for each of the major sectors of the economy.

In connection with this task the several Ministries and Departments of Government has submitted draft proposals. These proposals are now being examined by the Ministry of Planning and Economic Affairs with a view to ensuring that they are soundly conceived, adequately co-ordinated, and consistent with the availability of resources.

I have felt, however, that in some cases—and in the case of agriculture in particular—it might be useful, pending the adoption of final programmes, to make available to the general public the outlines of the draft proposals that have been submitted to the Planning Organisation. This will provide a general picture of the programmes that are under review whilst the process of scrutiny and adaptation is being undertaken. It will also afford the public an opportunity to express its views and criticisms on the general approaches that are being adopted in a particular field.

It is with these considerations in mind that I have authorised the publication of the draft proposals of the Ministry of Agriculture and Food. I need hardly say that considerable emphasis is being placed on agriculture in the Government's development plans. It is the agricultural programme that would reach out most directly to the rural population; and it is the progress of agriculture that will influence most closely Ceylon's future foreign exchange situation and her ability to industrialise. In publishing these draft proposals, I must stress once again that whilst some of these individual programmes have already received Cabinet approval in principle, others have yet to be so approved and all of them are subject to revision and adjustment in the context of the preparation of co-ordinated programmes of development ready for actual implementation.

Prime Minister and Minister of Planning
and Economic Affairs.

PREFACE

THE Government is now engaged in the preparation of programmes of development for each of the major sectors of the economy.

In connection with this task the several Ministries and Departments of Government has submitted draft proposals. These proposals are now being examined by the Ministry of Planning and Economic Affairs with a view to ensuring that they are soundly conceived, adequately co-ordinated, and consistent with the availability of resources.

I have felt, however, that in some cases—and in the case of agriculture in particular—it might be useful, pending the adoption of final programmes, to make available to the general public the outlines of the draft proposals that have been submitted to the Planning Organisation. This will provide a general picture of the programmes that are under review, whilst the process of scrutiny and adaptation is being undertaken. It will also afford the public an opportunity to express its views and criticisms on the general approaches that are being adopted in a particular field.

It is with these considerations in mind that I have authorised the publication of the draft proposals of the Ministry of Agriculture and Food. I need hardly say that considerable emphasis is being placed on agriculture in the Government's development plans. It is the agricultural programme that would reach out most directly to the rural population; and it is the progress of agriculture that will influence most closely Ceylon's future foreign exchange situation and her ability to industrialise. In publishing these draft proposals, I must stress once again that whilst some of these individual programmes have already received Cabinet approval in principle, others have yet to be so approved and all of them are subject to revision and adjustment in the context of the preparation of co-ordinated programmes of development ready for actual implementation.

Prime Minister and Minister of Planning and Economic Affairs.

13600

FOREWORD

I have pleasure in placing before the public a Five-Year Programme for the development of agriculture in the country. This programme must undoubtedly be treated as a draft for further discussion and amendment. It is also a programme which has benefitted greatly from the ideas and proposals that were embodied in agricultural development plans which had been prepared in previous years.

It is well known that the planning and implementation of agricultural development requires that a variety of factors should be harmonised at a variety of levels. For instance agricultural credit, agricultural marketing, agricultural supplies, irrigation and scientific methods of cultivation have to be linked together. Furthermore different activities must be suitably dispersed in districts and villages for all to be woven together both in planning as well as in the course of executing these plans in the field. The idea of weaving together the different factors of agricultural production forms a dominant theme of the draft programme, even though for convenience of presentation, different aspects have been dealt with under different chapter headings. For instance, the important elements of land and water are subjects falling under the purview of the Minister of Lands. The draft programme in its present form has been drawn up, where appropriate, with the co-operation of the Ministry of Lands and its execution will similarly be undertaken with the co-operation of that Ministry as well as of several other Ministries.

In the field of export agriculture, the programme proposes to raise the average annual production of tea by 90 million lbs. approximately by 1970. This increase of roughly 20 per cent. over the present level of production is to be secured by an expansion of the area under the Tea Replanting Subsidy Scheme and under the Rubber into Tea Replanting Subsidy Scheme as well as by securing the increased use of fertilizer on tea smallholders' lands through a modified Tea Rehabilitation Subsidy Scheme. For the first time, Government intends to actively interest itself in the expansion of manufacturing facilities for tea leaf as well as in upgrading quality standards in production by the institution of a loan scheme that will provide long-term credit on easy terms for the construction of new factories, for the replacement of old machinery in existing factories as well as for the expansion of the capacity of existing factories by the installation of new machinery.

In regard to rubber, the programme rests on the premise that the survival of the rubber industry depends on her ability to lower the cost of production to such levels as to make it competitive with synthetic rubber. Primary emphasis is therefore placed on the expansion of the area to be replanted in high yielding clones under the Rubber Replanting Subsidy Scheme. The Rubber Replanting Subsidy Scheme was begun in 1953 and up to date about 220,000 acres have been replanted under this scheme. The programme envisages the replanting of a further 100,000 acres by 1970, which will leave considering the area replanted outside the Subsidy Scheme, only a balance of about 200,000 acres, out of the entire area under rubber to be replanted after 1970. The increase in production from the 100,000 acres to be replanted between 1965 and 1970 alone, when this extent comes into bearing, is expected to be 30,000 tons. This would represent about 25 per cent. of the present production.

The present production of coconut is in the region of 2,800 million nuts per year for the three-year period ending 1964. It is intended to increase the average annual output by the three-year period ending 1970 to 3,200 million nuts. This will be secured chiefly through an expansion of the area fertilized under the Coconut Fertilizer Subsidy Scheme as well as through increments to current production secured by earlier replanting under the Coconut Rehabilitation Scheme. It is also intended for the first time to introduce a Coconut Replanting Subsidy Scheme, planned on the lines of the Tea Replanting Subsidy Scheme. The subsidized seedling distribution scheme will be continued on a better organised basis. This projected increase of approximately 14 per cent. over present production may appear small when compared to the projected increases in the other commercial crops. However it has to be remembered that since the coconut palm takes approximately 7 years to come into bearing after planting, the benefits of the replanting envisaged under the Coconut Replanting Subsidy Scheme will actually be seen as far as increased production is concerned, only after 1970. It must also be noted that the 100,000 acres to be replanted under the proposed Coconut Replanting Subsidy Scheme will, after it comes into full bearing, produce approximately 300 million nuts per year.

The programme also involves a restricted increase in the production of cocoa to be financed by the Cocoa Replanting Subsidy Scheme and a Subsidy Scheme for the planting of cocoa on marginal rubber lands. It is anticipated that an extent of approximately 11,000 acres will be replanted on this basis. This replanted acreage should produce after it comes into bearing annually approximately 40,000 cwt. of cocoa, which is incidentally the current export level in cocoa.

A programme of research in outline that is being undertaken by the Research Institute for Tea, Rubber and Coconut is also presented in the section dealing with export agriculture.

In the field of domestic agriculture, the primary objective has been one of import substitution. In the light of this emphasis, a large programme of production has been envisaged for paddy as well as for those subsidiary food crops such as chillies and onions, the imports of which at present require heavy foreign exchange expenditure. There appears to be no grave technical reason why these and in fact many other less important subsidiary food crops cannot be grown successfully and on a large scale in this country if proper facilities and conditions of management are provided for their cultivation. In this connection, it is worth mentioning that the programme of chilli cultivation that has been drawn up assumes that large scale cultivation of chilli can be successfully undertaken only in certain areas of the Island and on the basis of an assured water supply. Where a regular supply of water is not available at present in areas suitable for the cultivation of subsidiary food crops on a large scale, the draft programme posits utilization of ground water resources through lift irrigation schemes. Very attractive guaranteed prices have also been provided for crops such as chillies and onions so that a regular cultivation of these crops will prove economically profitable to the farmer.

The programme for paddy production envisages increasing the production of paddy from its present level of approximately 50 million bushels per year to 70 million bushels by 1970. This will involve an increase of approximately 20 million bushels of paddy or 290,000 tons of rice per year or an increase of 40 per cent. over present output and will therefore greatly reduce the Island's dependence on exports of rice from abroad. The average annual increase in production would be about 8 per cent.

In the field of subsidiary food crops, it is hoped within the next five years, to undertake on a settled basis the cultivation under different systems of irrigation of a wide range of subsidiary food crops together with chillies on an extent of approximately 40,000 acres. It is expected that by 1970, the country would produce the major part of its present annual requirements of chillies and also the entirety of its requirements of red onions. It is also proposed to increase the extents under cultivation in Bombay onions and pulses.

The programme for increasing paddy production has been drawn up on the basis that it is possible to increase production per acre on existing rice fields largely by a heavier and more balanced application of fertilizer. As such, provision has been included for an expansion of the fertilizer consumption from its present level of 60,000 tons per year to approximately 150,000 tons by 1970. The proposed programme for expansion of fertilizer consumption for paddy is also supported by a programme for the construction of fertilizer and seed paddy stores as well as for substantial imports of agricultural machinery and of the agro-chemicals required for paddy production. Arrangements are also being made to expand the output of improved varieties of seed, so that the entire extent of land fertilized annually can be covered by improved varieties of paddy. In this connection mention must also be made of the successful programme now under way, sponsored by the Freedom From Hunger Campaign Committee, which enjoys wide participation and support from the private sector, in association with the Ministries of Lands, Home Affairs, Education and Agriculture, for the mobilisation of school children for undertaking some of the principal labour operations in paddy cultivation, such as weeding and transplanting. In addition to increasing production on existing rice fields, the programme envisages the expansion of the acreage under paddy cultivation by providing irrigation and other facilities in respect of new lands to be cropped in paddy. In addition, arrangements are being made to bring into cultivation, approximately 100,000 acres that are now asswedumised, or prepared for settled rice cultivation, but are uncultivated for various reasons. A programme of research which will be undertaken by the Department of Agriculture in relation to paddy and other crops is also contained in this section. At the moment, an examination is being undertaken of the present arrangements for agricultural education in the country. It is intended to re-fashion the present system of agricultural education, so that in future, greater emphasis can be laid on the provision of pre-service and in-service training facilities to officers of all levels engaged in agriculture, while primary attention is devoted to a continuing programme of farmer education.

In the field of animal husbandry and milk production, it is proposed both to increase the local production of milk and to commence manufacture of milk products with a view to reduction of imports. It is proposed to make the island self-sufficient in its requirements of condensed milk by the opening of a Condensed Milk Factory to be established under the Milk Board at Polonnaruwa. The requirements of fresh milk for this factory will be obtained from the vicinity of the factory itself, both by an expansion of the Tamankaduwa Livestock Project as well as by encouraging the private sector to undertake dairy farming in the Tamankaduwa area, through incentives in the form of Crown land on lease, credit facilities and income tax concessions. In the up-country area, it is proposed to instal a Spray Drying Plant also under the Milk Board for the fresh milk requirements of which, arrangements will be made to increase the production of milk in the up-country area by expanding the herds at the Government Livestock Farms at Ambawela and Bopatalawa, by the importation of suitable temperate breeds of dairy cattle. It is also intended to intensify dairy farming in the coconut estates in the Colombo, Chilaw and Kurunegala districts with a view to supplying the requirements of the Milk Board for its Colombo factory. At the same time, the programmes now under way for assisting the small farmer by way of upgrading of the indigenous buffalo and neat cattle population by breeding programmes, notably by cross breeding with superior imported strains through the artificial insemination service, disease control and the expansion of training in improved animal and pasture management will be intensified.

In the field of meat production, emphasis is being laid on the evolution of a breed of beef cattle in Ceylon with a high rate of growth, early maturity, good adult weight and high dressing out percentage to meet the increased demand for good quality beef. It is intended to try out a modified stud centre system in the dry zone villages for the proper breeding of indigenous animals towards a meat production programme. In regard to goat and sheep rearing, it is intended to make the island ultimately self-sufficient in its requirements of mutton. Similar schemes are planned for the production of pig meat and broilers. It is also proposed to double the present per capita consumption of eggs, through the rapid improvement of the poultry industry.

The programme in the field of vegetable production places primary emphasis on the need to even out the present gluts and shortages that occur in vegetable production with consequent detriment to the interests of both producer and consumer. This will be secured primarily by expanding the area under vegetables in the off season as well as by changing the patterns of production of different types of vegetables in areas where seasonal gluts presently occur, so as to move into a new scheme of regional specialization in the cultivation of vegetables. In the field of agricultural marketing the programme contemplates investments with a view to improving the present marketing organisation, and envisages a large scale expansion of the co-operative principle in the organisation of vegetable production as well as of marketing. It is pre-eminently in the field of agricultural marketing, that local bodies can be expected to play a dominant role notably by the creation of good markets where they do not exist, or by the expansion of present marketing systems, where they are inadequate. Their active and wholehearted co-operation is requested.

The programme for horticulture will encourage the establishment of commercial orchards of popular fruits both for local consumption and for future export, in those regions of the country best suited to the wide range of fruits that can be grown in Ceylon. Steps are being taken to establish private nurseries in each of these regions for the supply of certified high quality planting materials to fruit growers in the region. Research and extension on fruit cultiyation will be intensified.

A very considerable part in the expansion of production envisaged in this programme will be taken by the private sector. Investors in the private sector will undertake large scale cultivation of subsidiary food crops as well as a variety of animal husbandry projects. They will be encouraged to do so by the liberal allocation of Crown land on lease, the release of foreign exchange for importing the necessary equipment, machinery, vehicles, fertilizers, agro-chemicals, etc. In accordance with the nature of the approval projects they will also be given generous tax concessions. The extent of land alienated to the private sector on this basis up to date is 10,000 acres.

In presenting this draft programme, I am deeply conscious of the fact that the drawing up of plans and their implementation are entirely different propositions. The best laid plan can be nullified unless a detailed strategy of implementation is worked out and imaginatively carried through. Having this fact in mind, the Ministry of Agriculture and Food in association with other government and non-governmental organisations is working out ways and means of implementing these proposals in the given areas of the island. In this respect, field officers engaged in agriculture and particularly the Government Agents have a crucial role to play. The recent decision of the government to appoint senior and experienced officers as Government Agents will considerably strengthen the organisation for implementing these programmes at district and village levels. Government Agents and public officers responsible for implementing these programmes are being given a clear idea of the implications of the programmes as broken up into their specific components in relation to their districts and areas of authority. It is also intended to evoke the participation of village organisations such as Cultivation Committees and Co-operative Societies in the implementation of this programme by assigning specific targets which will be worked out in co-operation with these institutions to be secured within their areas of authority in relation to the various aspects of production and marketing.

In conclusion, I wish to emphasise that the programmes here presented may prove insufficient or defective in various ways. It will be deeply appreciated if all these short-comings or defects are promptly brought to my notice, so that appropriate action could be taken to rectify them. In the process of implementing these plans, I would seek the active and critical participation of all sectors of the public and government officers.

MDBanda

Minister of Agriculture and Food.

2.1.66

CONTENTS

Page

1. THE DEVELOPMENT OF THE PLANTATION INDUSTRIES 1
2. RESEARCH PROGRAMME OF THE TEA RESEARCH INSTITUTE 41
3. RESEARCH PROGRAMME OF THE RUBBER RESEARCH INSTITUTE 55
4. RESEARCH PROGRAMME OF THE COCONUT RESEARCH INSTITUTE .. 63
5. INCREASED PADDY PRODUCTION 73
6. AGRICULTURAL CREDIT 95
7. THE PADDY LANDS ACT 109
8. MINOR IRRIGATION 119
9. CROP INSURANCE 127
10. A THREE YEAR PROGRAMME TO INCREASE THE CROPPED AREA UNDER PADDY BY 100,000 ACRES 153
11. RESEARCH PROGRAMME OF THE DEPARTMENT OF AGRICULTURE .. 173
12. SUBSIDIARY FOODCROPS 197
13. STORAGE REQUIREMENTS UNDER THE G.P.S. AND FOR DISTRIBUTION OF FOODSTUFFS 213
14. THE EXPANSION OF FERTILIZER USE 229
15. VEGETABLE AND FRUIT PRODUCTION 241
16. VEGETABLE AND FRUIT MARKETING 261
17. MILK PRODUCTION 283
18. DEVELOPMENT PROGRAMME OF THE NATIONAL MILK BOARD 305
19. MEAT AND EGG PRODUCTION.. 319
20. AGRICULTURAL DEVELOPMENT PROGRAMME FOR THE PRIVATE (NON-PEASANT) SECTOR 347

The Development of the Plantation Industries

2—

THE DEVELOPMENT OF THE PLANTATION INDUSTRIES

The dominant role that the three major plantation industries—Tea, Rubber and Coconut—play in the economy of Ceylon is generally well known. The extent of our dependence can be gauged from the fact that in 1964 nearly 96 per cent. of the total export income was derived from these three industries. The total value of our exports amounted to Rs. 1,842 million, of which the contribution by the three plantation industries was Rs. 1,773 million (Tea—Rs. 1,142 million; Rubber—Rs. 290 million; and Coconut—Rs. 341 million). An examination of Ceylon's National Income reveals much the same picture. According to provisional figures furnished by the Central Bank, the gross National Income from all sources amounted to Rs. 6,805 million, of which one-fourth, or Rs. 1,670 million, was directly derived from the tea, rubber and coconut industries.

2. These figures illustrate how closely the prosperity of the nation is linked with the progress made in the plantation industries. Further, it is only these industries which can provide the immediate foreign exchange resources that are vitally required not only for domestic imports but also for the industrialization of Ceylon. It has therefore been Government's constant endeavour to increase the productivity of these three main export industries through a vigorous programme of rehabilitation and development of the plantation industries. The revitalizing of these industries is all the more important as tea is presently fighting barely economic prices in a highly competitive world market, natural rubber faces ever increasing pressure from the synthetics and coconut has to contend with other natural oils as well as synthetic substitutes.

3. The present and proposed rehabilitation programme for the three major plantation industries are reviewed in the following pages. A revised programme for Cocoa, Ceylon's fourth largest export crop, is also included in the Development Plan.

TEA

4. The Replanting and Rehabilitation Scheme for the tea industry, which was introduced in 1959, is divided into two parts:—

(A) A REPLANTING SUBSIDY SCHEME under which subsidies are paid for the replanting of old tea lands with high-yielding varieties of tea. This Scheme was intended primarily for large tea estates over 100 acres in extent;

(B) A REHABILITATION SUBSIDY SCHEME under which subsidies are paid for improving the agricultural condition of tea lands by the application of fertilizer, adoption of soil conservation measures, supply of vacancies, etc. This Scheme was intended primarily for small-holdings and small estates under 100 acres in extent.

5. Under this programme, Government offered a subsidy of Rs. 2,500 per acre payable in instalments to estates for replanting, and a subsidy of Rs. 600 per acre payable in instalments to small-holdings participating in the Rehabilitation Scheme. The Government's expenditure on the Subsidy Scheme is financed by the tea industry itself through the imposition of a cess of 4 cents a pound of tea exported from Ceylon. At current export levels, the income to the Tea Subsidy Fund from the cess is roughly Rs. 19 million a year. Under the programme, roughly 80 per cent. of the total funds were to be set aside for the Replanting Scheme and the balance 20 per cent. for the Rehabilitation Scheme. This corresponded to a replanting target of 66,000 acres during the ten-year period 1959-1968, and a rehabilitation target of 60,000 acres over the same period.

(A) The Tea Replanting Subsidy Scheme

6. The tea Replanting Subsidy Scheme was introduced in order to induce estates to embark on regular and systematic replanting programmes with high-yielding strains of vegetatively-propagated tea. Prior to the introduction of the Replanting Scheme, practically no replanting was undertaken by estates due to the very high cost of replanting and the lack of technical know-how. The recent development by the Tea Research Institute and some enterprising estates of high-yielding varieties of tea giving yields of over 4,000 lbs. an acre, as compared to present yield in Ceylon of 815 lbs. an acre, has given a tremendous impetus to increasing output by replanting. Only those clones selected on the basis of yield, quality and other desirable secondary characteristics are approved for use under the Replanting Scheme.

7. When the Scheme was originally introduced, the subsidy payable was Rs. 2,500 per acre for replanting with approved varieties of V.P. tea. This subsidy was not paid in one lump-sum but was spread over a number of instalments. The target set for replanting was 5-6 thousand acres over a ten-year period from 1959. There was some hesitance on the part of estates to take to replanting during the early years of the Scheme due chiefly to the high cost of replanting. The initial response therefore fell below expectations.

8. In order to increase the pace of replanting, the Government decided to raise the subsidy from Rs. 2,500 an acre to a maximum of Rs. 3,750 an acre where reconditioning of the soil is obligatory, and Rs. 3,250 an acre where reconditioning of the soil is not considered necessary, with effect from 1st January, 1963. With the introduction of the enhanced rates of subsidy in 1963, there was a more encouraging response to the Scheme. The permits issued and the commitments incurred under the Tea Replanting Subsidy Scheme are as follows :—

Year	*Permits Issued* *Acres*	*Commitments Incurred* *Rs. Million*
1959	3,074	.. 7·7
1960	1,932	.. 4·8
1961	2,882	.. 7·2
1962	2,661	.. 6·7
1963	6,391	.. 22·4
1964	5,287	.. 18·5
1965 (Up to August) ..	3,867	.. 13·5
Total ..	26,094	.. 80·8

9. In 1964, the Replanting Scheme was thrown open to small-holders also, on the ground that there were an apreciable number of small-holders who had, over the last six years, acquired experience and technical know-how in V.P. work and were considered competent to handle replanting operations on their own. The acreage for which permits have been issued to small-holders to replant their lands is just over 1,000 acres or 5 per cent. of the total acreage for which permits have been issued under the Replanting Scheme.

10. At present the tea industry subsidizes the producers of locally-woven bata nursery baskets by compelling persons particjpating in the Tea Replanting Subsidy Scheme to purchase, but not necessarily use, bata baskets, for a period of three years commencing 1st January, 1963, until the bata basket weavers could find alternative employment or some other use for the bata available in their areas. Estates were not compelled to use these baskets because polythene bags were found technically superior to and cheaper than bata baskets. When the rate of subsidy was increased to a maximum of Rs. 3,750 an acre on 1st January, 1963, it took into account the increased cost that estates would have to bear to purchase these baskets. As the three-year period

lapses on 1st January, 1966, it is recommended that the obligation to purchase bata baskets be dispensed with in respect of future permits. The present rates of subsidy should, however, continue because of the increased cost of replanting operations. Although the target of 5,000 acres seems quite modest (less than 1 per cent. of the total acreage under tea), it is doubtful whether more ambitious figures could be reached and, hence, the present target of 5,000 acres a year requires no revision.

11. Under the Tea Replanting Subsidy Scheme, subsidies are given only for replanting old tea areas and not for new tea areas. "Replanting" is defined as the uprooting of an area of old tea and replanting the same area with V.P. tea *or* planting with V.P. tea an area which is not at present under tea and eradicating an equivalent area of old tea belonging to the same applicant.

12. Representations have been made from time to time by owners of tea estates that they own large extents of uncultivated lands which they are prepared to plant in tea, but as they do not have any uneconomic tea areas to eradicate against the new areas to be planted, they are unable to receive any benefit from th Tea Subsidy Scheme, although they make large contributions to the Tea Subsidy Fund by way of cess on the exports of their tea. In 1962, a Bill to amend the Tea Subsidy Act to enable new tea areas to be planted without eradication of corresponding acreages of old tea was presented to the House of Representatives. The Bill was not, however, proceeded with. The Ministry of Agriculture and Food has now decided to proceed with the proposed amendment provided—

(i) the total area of new tea on tea estates likely to be planted is not excessive and is subject to a definite limit; and

(ii) in every case before a permit for planting of new land on a tea estate under the Subsidy Scheme is granted, the Tea Controller consults the Government Agent of the District to ensure that the land in question is not required for Village Expansion.

13. The subsidy recommended for planting tea without eradication of a corresponding acreage of old tea elsewhere is Rs. 3,000 an acre.

14. The acreage for which it is proposed to issue replanting permits, and the financial commitments for the next five years, are given below :—

Year	*Acreage to be authorised for replanting* *Acres*	*Financial Commitments (inclusive of administration)* *Rs. Million**
1966	5,000	18·5
1967	5,000	18·5
1968	5,000	18·5
1969	5,000	18·5
1970	5,000	18·5
Total	25,000	92·5

(* No foreign exchange component.)

15. On permits issued during 1955-1970, it is expected that about 50,000 acres would be replanted. When these 50,000 acres of replanted tea come into full bearing, the increase in crop will exceed 100 million pounds annually. At current f.o.b. prices of tea (Rs. 2.50 a pound), the value of the increased output will be in the region of Rs. 250 million a year. The Tea Replanting Scheme will then be a substantial contributor to the foreign exchange earnings of Ceylon.

(B) The Tea Rehabilitation Subsidy Scheme

16. Under the Tea Rehabilitation Subsidy Scheme, owners of tea small-holdings and small estates under 100 acres in extent, were given subsidies totalling Rs. 600 per acre. From 1963 the subsidy rates were increased to Rs. 800 per acre. These subsidies are paid for the following purposes :—

(i) A subsidy of Rs. 300 an acre for the supply of vacancies ;

(ii) A subsidy of Rs. 100 an acre for soil conservation measures ;

(iii) A subsidy of Rs. 400 an acre intended to cover half the cost of fertilizer used on the land for a period of five years.

17. In the first four years itself, the applications received under the Rehabilitation Scheme exceeded the target acreage of 60,000 acres

laid down in the Ten-Year Plan. Permits have been issued to cover the following acreage :—

	Acreage acres	Commitment (Rs. Million)
Supply of vacancies	58,640	17·6
Soil conservation measures	68,929	6·9
Application of fertilizer	84,512	24·6
Total		49·1

In view of this, the issue of fresh permits was administratively suspended from 1963, except in the case of colonists who have been alienated land under the Government Village Expansion and Colonisation Schemes.

18. If the Tea Rehabilitation Scheme is to be stepped up above the level laid down in the Ten-Year Plan, it would mean that a larger percentage of the total Subsidy Fund would have to be allotted to small-holdings and small estates and only a smaller percentage of the funds would subsequently be available for the Replanting Scheme. Alternatively, the cess of 04 cents will have to be increased. It is not possible to recommend either of these measures because—

(i) the tea industry can ill afford an increase in the cess;

(ii) a reduction in the replanting programme would severely affect the long-term interests of the tea industry.

19. If, however, additional funds can be found, or fertilizer obtained from aid sources, it is recommended that a modified Rehabilitation Scheme, confined to the issue of fertilizer for a further period of five years, be put into operation immediately.

20. To ensure that these subsidies will go only to efficient producers and not for subsidising plantations that are in poor condition, it is proposed that only those lands that have filled all vacancies, maintained soil conservation measures and are in good agricultural condition, will be eligible to receive the fertilizer subsidy. There are 156,000 acres of tea land under 100 acres in extent. Of this acreage, it is estimated that about 60,000 acres will be eligible to apply for the fertilizer subsidy of Rs. 400 which will cover half the cost of fertilizer over a period of 5 years. The total cost of the extended Rehabilitation Scheme will be Rs. 24 million, or Rs. 5 million a year, including the cost of administration. This Scheme, as stated earlier, cannot be financed out of the Tea Subsidy Fund because the annual income of

Rs. 19 million from the cess will be completely absorbed by the Tea Replanting Subsidy Scheme (5,000 acres a year at Rs. 3,750 per acre). The additional Rs. 5 million required annually for the amended Tea Rehabilitation Subsidy Scheme will have to be voted by Government as an annual grant to the Tea Subsidy Fund. The commitments and expenditure of the Fertilizer Scheme will be as follows :—

Year	Acreage to be given Fertilizer subsidy	Commitments (inclusive of administration) (Rs. Million)*
1966	60,000	5·0
1967	60,000	5·0
1968	60,000	5·0
1969	60,000	5·0
1970	60,000	5·0
	Total	25·0

* Foreign exchange component is approximately 75%

It is estimated that the Island's tea crop will increase by 12 million pounds annually by the systematic application of fertilizer under the Fertilizer Subsidy Scheme.

(C) Rubber into Tea Replanting Scheme

21. In addition to the Tea Replanting and Rehabilitation Subsidy Schemes, the Government in 1962 introduced a new scheme known as the "Rubber into Tea Replanting Subsidy Scheme" for the replanting of uneconomic rubber lands in tea, where climatic and soil conditions favour the replanting in tea rather than in rubber. Under this scheme a subsidy of Rs. 1,500 an acre is paid for the replanting operations. The target acreage under this scheme has been fixed at 8,000 acres. The permits issued and the commitments incurred under this scheme since 1962 are as follows :—

Year	Permits Issued Acres	Commitments Incurred Rs. Million
1962	1,374	2·1
1963	852	1·3
1964	678	1·0
1965 (Up to August)	528	0·8
Total	3,432	5·2

22. This subsidy of Rs. 1,500 compares very unfavourably with the subsidy of Rs. 3,750 granted under the Tea Replanting Subsidy

Scheme. One of the main reasons for this disparity in subsidy rates was that in the case of the Rubber into Tea Scheme, funds have to be allotted from the Rubber Replanting Subsidy Fund. The Rubber Replanting Subsidy Scheme caters for the replanting of worn-out rubber lands with high-yielding varieties of rubber or with alternative crops. The financial resources of the Rubber Replanting Subsidy Fund are limited and hence it was not possible to increase the rate of subsidy to more than Rs. 1,500 an acre. If additional funds could be secured from alternative sources, it is suggested that the rate of subsidy for replanting uneconomic rubber lands with tea be increased to at least Rs. 3,000 an acre. If this proposal is agreed to, the target acreage that could be replanted and the financial commitments under this scheme during the next five years would be as follows :—

Year	*Target Acreage* *Acres*	*Financial Commitments (inclusive of administration) (Rs. Million)**
1966	1,000	3·3
1967	1,000	3·3
1968	1,000	3·3
1969	1,000	3·3
1970	1,000	3·3
	Total	16·5

* No foreign exchange component.

(D) Loan Scheme for the Purchase of Tea Machinery and Construction of New Tea Factories

The need for a Loan Scheme for Factory Development

23. Over the years, there has been, on the average, a steady and substantial increase in tea production in Ceylon. The Island's production of tea in 1964 was 482 million pounds. This is an increase of 175 million pounds more than (or 50 per cent. over) the level of production in 1950. The yields are expected to rise still further as a result of the application of improved agricultural practices and the coming into bearing of areas replanted with high-yielding vegetatively-propagated clones under the Tea Replanting Subsidy Scheme which was launched in 1959. It is estimated that tea production will increase by another 100 million pounds by 1970. The increase in the tea crop, however, has not been matched by a corresponding increase in factory capacity, with the result that a large number of tea factories in the Island are now being worked beyond their rated capacities.

24. The increasing burden of taxation, in recent years, has left even the best Tea Companies with very little retained earnings for capital investment of any form, leave alone factory extension. The Mahadeva

Committee had the following comments to make on factory capacity in their report on Development and Taxation in the Plantation Industry submitted in 1961 :—

> " It is quite clear that factory-extension in Ceylon has not kept pace with the growth of tea crops. What has happened is that estates are now utilizing the surplus reserve capacity which they formerly had in their factories to cope with the increased crop and have not carried out new factory construction or factory extension on anything like the scale required. As a result, Ceylon's tea factories are strained to their utmost capacity and, in seasonal peak periods, are being worked beyond their rated capacity with adverse effects on the quality of the tea produced."

25. The position has not improved since the report was written four years ago. In fact, had it not been for certain innovations such as the introduction of trough witherers and the use of nylon netting instead of jute, thereby increasing the through-put of green leaf and, indirectly, factory capacity, the position would have been more serious. Besides, Ceylon has not kept pace with the technological developments made in other countries in relation to tea manufacture. Modernisation programmes which are essential for effecting economies in production costs and improving the quality of tea have not been adopted by most of the estates. Very little or no new tea machinery have been installed during the last ten years and most of the machinery now in use is relatively outdated. Import controls, lack of foreign exchange and difficulties in obtaining spares and replacements have also contributed in the last two years to an injurious running down of the existing tea machinery.

26. The combined effect of these factors have tended to depress the quality of tea produced by Ceylon, resulting in low prices. The International Conference on Tea held under the auspices of the F. A. O. in Nuwara Eliya in May, 1965, at which leading countries interested in the production and consumption of tea were present, had the following observations to make in regard to the price of Ceylon teas :—

> " The more rapid decline in the world market prices of Ceylon teas, as compared with North Indian teas, in recent years, meant that Ceylon teas as a whole were now lower valued at London and on the world market generally than North Indian teas as a whole. The contrary had been the case throughout the period between the two World Wars and during much of the period after the Second World War."

The Ceylon Delegation at the Conference were of the view that one of the major reasons for the lower prices for Ceylon teas was because quality had been unwittingly sacrificed by excessive demands on factory capacity. This confirmed the earlier opinion expressed in the Mahadeva Committee Report.

27. The current situation calls for an organised plan of financial assistance for factory development if the tea industry is to survive in the face of growing competition from other tea producing countries. India has already taken the lead in this direction and several schemes for financial assistance, including the granting of loans for the purchase of new machinery and equipment on easy payment terms have already been implemented. The credit facilities now available to the Ceylon tea industry from the commercial Banks and from other credit institutions are not so attractive or liberal as to induce estates to borrow money from them for fresh capital investment on factory development. It is therefore proposed to operate a Loan Scheme in Ceylon at low interest rates and on less rigorous terms to induce factory owners to purchase machinery for extensions of existing factories and for the replacement of existing machinery with more modern and up-to-date equipment. In addition, it is proposed to grant loans for the construction of new tea factories.

Broad Outline of the proposed Scheme

28. The Scheme suggested shall be in two parts—

(i) Loans for the purchase of new machinery either as replacements for existing machinery or as additional installations and loans for the purchase of machinery for extensions to existing factories.

(ii) Loans for the construction of new factories.

Funds required for the Scheme

29. It is estimated that the capital investment required for factory development to match the present level of production of tea is about Rs. 40 million. In addition to this, a further sum of Rs. 90 million should be invested to meet the estimated increase in crops during the next five years. Besides these investments, electrification of tea factories which is considered a pre-requisite to any effective factory development plan, will cost a sum of Rs. 20 million. Therefore the total investment required for factory development during the period 1966 to 1970 will be about Rs. 150 million, of which the foreign exchange component will be approximately Rs. 80 million. A substantial portion of the required investment on factory development will have to be made available to the tea industry through the proposed loan scheme.

30. The Tea Subsidy Fund has at present Rs. 55 million in the form of investments which are required for the payment of future instalments of subsidies under the Tea Replanting and Rehabilitation Subsidy Schemes. As these subsidies are not paid out in one lump-sum but are given in instalments spread over a number of years as and when each stage of the work is completed, the full amount of the investments will not be required for some years to meet the subsidy payments. It is suggested that a sum of Rs. 30 million from the Tea Subsidy Fund investments may be used for the initial financing of the loan scheme.

Conditions governing the Loan

31. Loans will carry an interest rate of 3½ per cent. per annum (with a rebate of ½ per cent. per annum for prompt payments.) The repayment of the loan will be completed within a prescribed period. The security for the loan will be—

(*a*) hypothecation of immovable property such as the factory or estate ;

(*b*) a guarantee given by an Agency House, Commercial Bank or a Brokers' Firm ;

(*c*) a lien on produce.

Economic Advantages of the Scheme

32. This Scheme, when fully implemented, is expected to result in better-quality tea and consequently a higher export earning potential for the country. It is difficult to assess the qualitative improvement itself in financial terms as a result of the better manufacturing facilities. The foreign exchange earnings will undoubtedly be increased. But what is more important, though less tangible, is the real achievement of preserving the image of Ceylon as the world's leading producer of quality tea.

(E) Instant Tea

33. "Instant Tea" is an extract of the soluble components of tea. With Instant Tea one can make a cup of tea merely by putting a part of a teaspoonful of powder into a cup and adding hot water. The preparation of instant tea requires no tea pot and no messy tea leaves remain to be disposed of.

34. In the Western world, where labour is expensive, any food product which reduces the work and effort which the housewife has to expend, is likely to sell well. This is clearly proved by the experience of instant coffee over the last decade. In the United Kingdom, for

example, 65 per cent. of all coffee now marketed is instant coffee. Th same trend is evident both in the United States and in Wester Europe. Instant coffee has not only largely replaced natural groun coffee in the home but has also opened up entirely new markets fo coffee. One example of these new markets is the sale of coffee fron vending machines in shops, railway stations, sports stadiums, etc. I a high-quality instant tea can be produced and marketed, it is highl probable that the new product will not only gradually replace conventional tea in the wealthier countries, but that it will increase th total demand for tea in these countries.

35. It is most important to us in Ceylon that the total world deman for tea should be rapidly expanded. Ceylon's production of tea ha been rising rapidly over the last two decades and is likely to pass th 500 million pound mark in the mid nineteen-sixties, if the presen trend continues unbroken. If, the pace of replanting under the Te Replanting Subsidy Scheme is stepped up, the rate of expansion wil be still greater. Other tea producing countries are also increasin their output. A recent F.A.O. analysis has shown that the balanc between world production and consumption of tea by 1970 will be a very close one. It is very dangerous for Ceylon to depend on such a close balance in the world's tea markets, considering that one-fifth o our gross national product and two-thirds of our foreign exchang earnings are derived from the tea industry, which could quite easily be ruined by an excess of world production over consumption. The only way of avoiding this danger is to enlarge the world consumptio of tea faster than production. If instant tea catches on in the same way as instant coffee has, it would go a long way towards achieving this object.

36. In 1959, the Tea Research Institute of Ceylon, in collaboratio with the Ceylon Institute of Industrial and Scientific Research, bega work on the development of a new type of instant tea in Ceylon. By about 1961 they had developed a product which was favourably reported upon by tea tasters both in Ceylon and abroad. There had, of course, been other brands of Instant Tea on the market prior to the development of this new product.

There was, however, a fundamental difference between the produc developed in Ceylon and those which had previously been on the conventional tea market. The Ceylon product is made direct from gree tea leaf whereas all the other products which had previously been o the market were manufactured from conventional black tea. Thi means that the Ceylon product has to be manufactured in factorie situated in tea-producing countries and cannot be manufactured a the consumer end. The new process also eliminated an unnecessary stage of the manufacturing process in which green tea leaf was first converted into conventional black tea and then into a soluble powder. The flavour of the Ceylon product was therefore closer to that of conventional tea than the instant teas manufactured in consuming countries.

37. After the experimental work in the development of the new product was completed, the next step was to interest commercial firms in this project in order to move the product from the laboratory into the commercial field. It was felt that the best way of making rapid and effective progress was to encourage a foreign Company skilled in good factory techniques and having a wide and efficient sales organisation, to undertake the manufacture of instant tea in Ceylon and its distribution. The marketing of the product in foreign countries required subtle persuasion of consumers which could be more effectively handled by foreign firms rather than by Ceylonese ventures.

38. Inquiries were made from a number of European and American firms and eventually a German firm (Messrs. Haelssen & Lyon of Hamburg) was entrusted with the development of the project. An agreement was entered into between the Government of Ceylon and Messrs. Haelssen & Lyon on 15th January, 1962. Under this agreement it was agreed—

(i) That a new Company to be called "CeyTea Ltd." should be floated which would manufacture Instant Tea and market it under the name "CeyTea."

(ii) As regards the capital structure of the Company, it was agreed that in the initial stages the German firm (Haelssen & Lyon Ltd.) would take the majority of the shares, with provision for the eventual transfer by sale, of the majority holdings to Ceylonese, during a stipulated period of time. The Government retained the right to purchase any or all of the shares offered for sale on the local share market at the prevailing prices but agreed that it would not acquire the Company or its shares in any other manner for a period of at least 20 years.

(iii) Messrs. CeyTea Ltd., were given a monopoly of the production of instant tea in Ceylon subject to the following conditions:

(a) The Government would have the right to terminate the monopoly in five years if the Government was not satisfied that genuine efforts were made by the Company to produce and sell as much instant tea as possible;

(b) The dividends paid to shareholders of the Company were kept low in the initial stages in order that a reasonable portion of the profits could be ploughed back for the expansion of the project;

(c) The Company would not use the process for the manufacture of instant tea in any other tea-producing country except with the concurrence of the Ceylon Government;

(d) The Company would not market tea in Commonwealth countries without the concurrence of the Government of Ceylon.

(e) The Company would arrange for the training of Ceylonese nationals in the technical work involved in setting up and running instant tea factories.

(iv) The Agreement also provided for concessionary rates of import and export duties, the income tax concessions customarily offered to investors in new fields, facilities for remittance of dividends, and for eventual repatriation of capital.

39. The actual manufacture of Instant Tea in Ceylon was undertaken by a new rupee Company floated in Ceylon by the foreign investor which was registered under the name CeyTea (Ceylon) Ltd. This firm has invested about Rs. 6 million in this project and the quality of the Instant Tea being produced in this factory has been very favourably commented on by persons in the tea trade, both in Ceylon and abroad. This factory has recently been expanded in capacity and is now capable of producing about 2,000,000 lb. of instant tea a year, and is sufficient to take the output of green leaf of about 9,000 acres of first-class tea. The cost of erecting the factory has, however, exceeded the initial expectations because there were several production snags in the process of converting the laboratory product to large-scale commercial manufacture. The commercial product however has now been greatly improved and is being marketed in the U.K. and the Continent in small quantities. The Company, CeyTea (Ceylon) Ltd., then reached a stage where it was necessary to invest a very much larger sum of money in order to advertise the product on a wide scale in the U. S. A. and Europe and to arrange for an adequate retail distribution system for the product. It has been estimated that the expenditure on market research, advertising, distribution etc. would be about £750,000

for a three-year advertising programme. Messrs. Haelssen & Lyons had come to a state where the project would have to be abandoned due to inadequacy of financial, technical and marketing resources to make it viable and they had therefore been carrying on negotiations with an organisation which had these resources. Eventually these negotiations were concluded with the approval of the Government of Ceylon for the outright sale of the Hamburg parent Company to Unilevers and its associated American Company, Liptons. Unilevers intend to concentrate for a period on intensive research and development of the project, particularly with a view to making the product attractive to the consumer, before embarking on large-scale commercial production.

40. In January 1965 the Government of Ceylon agreed to the formal transfer of the CeyTea Group of Companies, both in Ceylon and in Hamburg, to Unilever Ltd. and to carry on the undertaking on the same conditions. To give effect to this change, certain amendments to the principal agreement are now under consideration by the Government of Ceylon and the Unilever Group, London.

41. A serious difficulty that is being experienced in the marketing of instant tea in Western Europe is the high duty which is at present levied on all instant tea imported into the Common Market countries. Since 1st January, 1964, conventional black tea is allowed to enter the Common Market free of duty if it is imported in bulk and is charged a nominal duty of 5 per cent. if it is imported in packeted form. Prior to 1st January, 1964, conventional tea paid a duty of 18 per cent. if it was imported in bulk and 23 per cent. if it was imported in packeted form. It will be very difficult to market successfully a new product like instant tea in the Common Market countries with a big difference in duty between instant tea and conventional tea. The position is made more difficult by the fact that a variety of instant tea—"Nestea"—is already being produced within the Common Market countries and is not therefore liable to this duty. "Nestea" is a product of the Nestle's organisation and is produced from conventional black tea.

42. The question of duty on instant tea has been taken up by the Ceylon High Commissioner and the Ceylon Trade Commissioner in the United Kingdom with the E. E. C. authorities in Brussels, and the views of the Ceylon Government will be strongly canvassed at the Kennedy Round of the Tariff Negotiations.

Summary of Development Programme for Tea

43. The funds required to implement the development schemes in the tea industry for the period 1966–1970, are given below :—

	Total Investment required	*Tea Subsidy Fund*	*Rubber Subsidy Fund*	*Additional funds required*
	(In Millions of Rupees)			
Tea Replanting Subsidy Scheme (Vide Section A)	92·5	92·5	—	—
Fertilizer Subsidy under the Tea Rehabilitation Scheme (Vide Section B)	25·0	—	—	25·0
Rubber into Tea Replanting Scheme (Vide Section C)	16·5	—	8·2	8·3
Total	134·0*	92·5	8·2	33·3

*Foreign Exchange component—Rs. 18 million.

44. It will be seen from the above statement that out of a total investment of Rs. 134 million required to finance the development plan for tea during the five-year period, a sum of Rs. 100.7 million could be found from the Tea Subsidy Fund and Rubber Subsidy Fund. The additional sum of Rs. 33.3 million required for the development plan will have to be found from other sources. The above statement includes only the investment required for outright grants to the tea industry. The money required for the Loan Scheme for factory development is not included in this statement as the money utilised will be in the form of repayable loans. The Loan Scheme might eventually become self-supporting—somewhat on the lines of a revolving fund.

45. The area, production, export and f.o.b. value of tea exports in the last five years are shown below :—

Year	*Area*	*Output*	*Exports*		*F.O.B. value per lb.*	*Total Value of Exports*
			Entries passed	*Actual*		
	(000' Acres)	*(Lbs. Million)*	*(Lbs. Million)*		*Rs. c.*	*(Rs. Million)*
1960	582	435	410	400	2 67	1,096
1961	587	455	426	427	2 62	1,114
1962	591	467	452	443	2 54	1,148
1963	587	485	456	455	2 50	1,140
1964	592	482	455	449	2 51	1,141
1965 (Estimated)	593	485	460	450	2 50	1,150

46. Projections in respect of output, export volume and foreign exchange earnings during the periods 1966–1970 are as follows:—

Year	*Output*	*Domestic Consumption*	*Export Volume*	*Value of Exports at 1965 prices*
	(In Millions of Lbs.)			*(Rs. Million)*
1966	500 ..	35 ..	465 ..	1,162
1967	515 ..	36 ..	479 ..	1,197
1968	532 ..	37 ..	495 ..	1,237
1969	552 ..	38 ..	514 ..	1,285
1970	575 ..	39 ..	536 ..	1,340

RUBBER

The Rubber Replanting Subsidy Scheme

47. The Rubber Control Department estimated in 1952 that, of the total registered rubber area in Ceylon of 650,000 acres, no less than 200,000 acres were uneconomic and in urgent need of replanting. The Government's Rubber Replanting Subsidy Scheme was launched in 1953 and was extended for a further period of five years, from 1958 to 1962, with the object of replanting this extent of uneconomic rubber by the end of 1962. In 1963, the Scheme was again extended for a further period of five years (1963–1968), as the downward pressure on prices of natural rubber in the last few years and the problem posed by excessive synthetic capacity made it imperative that the pace of the Rubber Replanting Subsidy Scheme be maintained with a view to raising the general level of efficiency of the natural rubber industry in Ceylon.

48. The subsidies under the Scheme were paid to proprietors of uneconomic rubber lands on the following graded scale:—

	Proir to 1962 per acre Rs.	*After 1962 per acre* Rs.
(*a*) If the area to be replanted forms part of an estate 100 acres or more in extent, the subsidy paid was	700 ..	1,000
(*b*) If the area to be replanted forms part of an estate between 10 and 100 acres in extent, the subsidy paid was	900 ..	1,100
(*c*) In the case of small-holdings under 10 acres in extent, the subsidy paid was	1,000 ..	1,200

49. Twelve years have passed since the Rubber Replanting Subsidy Scheme was inaugurated. During this period over a third of the

Island's acreage in rubber, or almost 220,000 acres, have been replanted under the Scheme. This works out to an average annual rate of about 20,000 acres a year, which is slightly lower than the theoretical ideal rate of replanting on the baiss that the economic life of a rubber tree does not exceed 30 to 35 years. This average, however, conceals the fact that there has been a marked fall in the response to the Rubber Replanting Subsidy Scheme in the last few years, as the following Table will indicate :—

Year	*Applications received (Acreage covered)*	*Permits Issued* (Acreage covered)*	*Acreage Replanted within the year (Acres)*
1958	35,764	21,040	20,640
1959	34,311	22,818	18,532
1960	31,589	19,076	17,895
1961	31,357	18,611	18,687
1962	32,295	16,730	17,956
1963	24,623	16,487	15,595
1964	23,345	15,730	13,553
1965	21,925	14,586	12,000 (Estimated)

*These figures are revised annually, depending on cancellations, non-utilization, etc.

A detailed statement of the progress of the Rubber Replanting Subsidy Scheme is shown in Table A on page 19.

50. The largest shortfall is in the category of application received from estates over 100 acres in extent and estates between 10 and 100 acres. Small-holders, however, continue to take advantage of the inducements offered under the Rubber Replanting Subsidy Scheme, though not to the same extent as in the earlier years. This fall in the rate of replanting cannot be viewed with equanimity. The natural rubber producing countries have recognised that the survival of the rubber industry depends on her ability to lower the cost of production to such levels as to make it competitive with synthetic rubber. The answer to this is extensive replanting with high-yielding clones.

51. Vigorous replanting and rehabilitation programmes have, already been undertaken by other rubber producing countries and unless Ceylon keeps pace she is liable to be priced out of the market by her sister countries. Unlike in the past when an average rate of 20,000 acres was considered satisfactory, the change in conditions today make it imperative that the rate of replanting should be accelerated. In fact, the natural rubber industry has been given a short breathing space in which to prepare herself for fiercer competition from synthetic rubber and a gradual erosion of the premium that natural rubber now commands over synthetic rubber. During this

breathing space of 4 to 5 years, the maximum amount of replanting should be undertaken. It is the view of representatives of the rubber industry that any acceleration in the current pace of replanting would require incentives in the form of higher rates of subsidy. It is suggested that the replanting subsidy be increased to Rs. 1,400 an acre for estates 100 acres and over in extent, and Rs. 1,500 an acre for holdings under 100 acres in extent. Despite the enhanced subsidy it is doubtful whether the annual rate of replanting will exceed 20,000 acres. A higher average would, of course, be both welcome and desirable but it is the view of the representatives of the planting industry that a replanting target of 20,000 acres a year will be a more realisitc figure and in keeping with the hazards that forward planning imposes on owners of rubber lands.

52. Estates are not in a position to increase the pace of replanting immediately as the programme for slaughter-tapping of the areas to be replanted has to be planned and undertaken 3 to 4 years in advance. Nurseries, too, have to be laid down and suitable planting material raised in time for the forthcoming season's replanting operations. The long gestation period of 7 years before a rubber tree comes into tapping is also a disincentive factor which weighs heavily with both proprietors and share-holders. For these reasons an annual average of 20,000 acres over the next five years is considered reasonable.

53. The investment under the revised Rubber Replanting Programme will be as follows :—

Year	*Acreage under Permits (Acres)*	*Subsidy Commitments (Rs. Million)*
1966	15,000	23·4
1967	17,500	27·0
1968	20,000	30·7
1969	22,500	34·4
1970	25,000	38·0

The current expenditure on the Rubber Replanting Subsidy Scheme is met by an annual advance not exceeding Rs. 20 million from the Consolidated Fund to the Rubber Replanting Subsidy Fund. This is statutorily laid down in the Rubber Replanting Subsidy Act, No. 5 of 1958. Since the revised Rubber Replanting Subsidy Programme involves commitments exceeding Rs. 20 million a year, the Act will have to be amended to provide for the increased advances from the

Consolidated Fund. It is expected that the expenditure will not exceed Rs. 40 million in any given year.

54. Although the acreage under rubber registered by the Rubber Control Department is about 675,000 acres, the Agricultural Survey of 1962* indicates that the actual acreage under rubber cultivation is 570,000 acres. The balance 100,000 acres, although they carried rubber at the time they were originally registered over 30 years ago, have now been abandoned and allowed to go into jungle. Almost two-thirds of this 100,000 acres are found in the districts of Kandy, Matale and higher elevations of Kegalle which are unfavourable for rubber cultivation. These lands should not be planted in rubber but in other suitable crops. (Vide Table B on page 20.)

55. At the end of 1970, if the revised replanting programme is adopted, a total of 330,000 acres would have been planted with high-yielding clones under the Rubber Replanting Subsidy Scheme. About 40,000 acres of the acreage planted outside the Rubber Replanting Subsidy Scheme prior to 1953 can also be classified as high-yielding stock. When this is taken into account, there would be a balance of nearly 200,000 acres of rubber by 1970 which will have to be replanted in high-yielding rubber or replaced with alternative crops, depending on the future prospects for natural rubber.

56. The total cost of the revised replanting scheme for replanting 100,000 acres by 1970 will just exceed Rs. 150 million. The increase in production when this replanted acreage comes into full tapping would be, on a conservative estimate, about 30,000 tons. Even if this increased production is valued at a depressed f.o.b. price of Re. 1 per lb. (current unit value of exports is Rs. 1.12), the increased production will bring in foreign exchange to the tune of Rs. 66 million a year. In other words, in less than two and a half years the increased production would cover the entire expenditure by Government on the Scheme.

57. The Rubber Replanting Subsidy Scheme has now begun to show results through small but significant increases in production. These increases, however, have been offset by the gradual decline in the unit value of exports, as the following figures indicate :—

Year	*Production (Lbs. Million)*	*Exports (Lbs. Million)*	*F.O.B. Value per lb. Rs. c.*	*Total Valu of Exports (Rs. Million)*
1960	218	234	1 61	378
1961	215	197	1 32	260
1962	229	224	1 29	290
1963	239	209	1 22	257
1964	246	254	1 15	292
1965 (Estimated)	258	250	1 12	280

---

* Unpublished.

58. The estimated production for the period 1966–1970, taking into account the increases in production due to the replanting programme undertaken earlier as well as the temporary decreases because of the withdrawal of areas for replanting, and the foreign exchange earnings on the basis of tentative price forecasts, are given in the Table below :—

Year	*Output (Lbs. Million)*	*Foreign Exchange Earnings Estimated value of output at f.o.b. price*		
		Re. 1.00 (Rs. Million)	*Rs. 1.05 (Rs. Million)*	*Rs. 1.10 (Rs. Million)*
1966	270	270	283	297
1967	282	282	296	310
1968	294	294	309	323
1969	307	307	322	338
1970	320	320	336	352

TABLE A

Acreage Replanted under the Rubber Replanting Subsidy Scheme

Year	*Permits Issued (Acreage)*	*Acreage Replanted*	*Acreage in bearing (Cumulative)*	*Total Commitments (Rs. Million)*	*Commitments Paid (Rs. Million)*	*Balance Commitments (Rs. Million)*
1953	8,002	8,002	—	6·2	6·2	—
1954	18,334	18,302	—	15·0	15·0	—
1955	26,183	26,162	—	22·0	22·0	—
1956	22,878	22,850	—	19·5	19·2	·3
1957	25,264	25,189	—	21·4	21·0	·4
1958	21,055	20,918	—	17·7	17·5	·2
1959	22,791	22,436	5,799	19·4	18·8	·6
1960	19,208	18,583	24,252	16·0	15·5	·5
1961	18,796	17,600	45,171	14·9	14·0	·9
1962	16,648	15,364	69,747	18·0	12·5	5·5
1963	19,044	13,084	103,976	18·1	7·9	10·2
1964	15,987	9,307	124,616	17·3	3·9	13·4
1965	14,586	2,318	133,148	15·9	1·5	14·4
Total	248,776	220,115	506,709	221·4	175·0	46·4

TABLE B

Rubber Acreage Statistics

District	Registered Acreage according to Rubber Control Department	Provisional Acreage according to 1962 Agricultural Survey of Census and Statistics Department	Acreage replanted under the Rubber Replanting Subsidy Scheme as at 31.12.64
Colombo	66,556	63,705	25,449
Kalutara	129,190	125,999	53,111
Galle	75,488	57,869	22,854
Matara	29,187	23,447	9,247
Hambantota	245	218	26
Ratnapura	105,028	96,235	33,670
Kegalle	152,100	129,143	60,669
Kurunegala	18,697	15,494	4,798
Chilaw	77	130	—
Kandy	46,001	17,073	2,431
Matale	32,924	20,632	2,593
Nuwara Eliya	274	183	151
Badulla	19,916	16,541	1,836
Total	675,683	566,669	216,835*

*The acreage replanted as at 31.8.65 is 220,000 acres.

COCONUT

59. Coconut occupies by far the largest area of land of the major plantation crops and covers almost the combined acreage under tea and rubber. The area reported to be under coconut at the 1929 Census was 1,076,220 acres which was practically the same acreage reported in the 1946 Census (1,070,942 acres). The total area under cultivation today is still in the region of 1.1 million acres as there has been relatively no expansion in the area under coconut for the last 35 years. The preliminary results of the 1962 Agricultural Census confirms this figure.

Measures to Increase Productivity

60. The coconut industry in Ceylon is not as well organised as the tea or rubber industries. 70 per cent. of the land under coconut constitutes small-holdings less than 20 acres in extent. These lands are generally maintained far below the required standard. To increase the productivity of, and to improve the condition of the Island's

coconut estates and small-holdings, the Government launched a Coconut Rehabilitation Scheme in 1956. This Scheme consists of two parts :—

(1) Improving the yields of coconut lands by the supply of fertilizer at subsidised prices ; and

(2) Filling vacancies, replanting low-yielding palms and replanting of older coconut areas with selected high-grade coconut seedlings at subsidised rates.

Coconut Fertilizer Subsidy Scheme

61. Under the Coconut Fertilizer Subsidy Scheme, owners of coconut lands over 20 acres in extent receive a Government subsidy of one-third the cost of fertilizer, while small-holders receive a subsidy amounting to half the cost of fertilizer. The response to the Fertilizer Subsidy Scheme since its inception has been encouraging. Prior to 1956, the quantity of fertilizer used on coconut lands was about 10 to 12 thousand tons. This figure has increased four-fold after the introduction of the Coconut Fertilizer Subsidy Scheme. The following statement shows the quantity of fertilizer distributed and the subsidy paid thereon :—

Year	*Quantity Issued* *Tons*	*Subsidy Paid* *Rs.*
1956	31,320	4,009,180
1957	31,337	4,485,021
1958	34,758	4,519,478
1959	44,030	5,952,556
1960	42,176	5,453,447
1961	38,800	4,906,612
1962	44,983	5,882,229
1963	48,804	6,447,437
1964	47,406	7,185,781

62. The cumulative effect of the fertilizer used under the Scheme has resulted in increases in the Island's total production of coconut. The productivity of a coconut plantation in a given year is closely related to the rainfall in the previous year. In studying production trends, therefore, it is best to take the average annual production

over 3 to 4 years. The following Table gives figures of local consumption (computed), exports and total production (computed) of coconuts since 1956 :—

Period	*Average Annual Local Consumption*	*Average Annual Exports*	*Average Annual Production*
	(In Millions of Nuts)		
1956–1958	1,089	1,094	2,183
1959–1961	1,212	1,161	2,372
1962–1964	1,335	1,459	2,794

63. The increase in production has been achieved as a result of the higher levels of fertilizer application. The Director, Coconut Research Institute, has unequivocally stated that these benefits in yields (performance) have flowed from the Government sponsored Fertilizer Subsidy Scheme. The current yields already reflect the increased productivity due to fertilizer response, and unless fertilizer consumption exceeds current levels, there will be very little further increases in productivity on this score. Alternatively, if there is a drop in fertilizer consumption, there will be a corresponding decrease in the total production of coconuts in subsequent years.

64. There is, however, a great deal of scope for increased fertilizer use on coconut lands. The Coconut Research Institute recommends a rate of application of 7 lb. of inorganic fertilizer annually for mature palms, equivalent to 3½ to 4 cwts. per acre. Young palms require less fertilizer varying from ½ to 3 cwts. per acre a year. On this basis, it is estimated that the quantity of fertilizer supplied in 1964 was sufficient to cover 245 to 300 thousand acres of coconut lands. Obviously there is room for the increased use of fertilizer on the balance 850,000 acres of coconut land.

65. From an analysis of the records maintained by the Department of Coconut Rehabilitation, it has been found that only 70 per cent. of the fertilizer for which permits are issued are taken up by the permit-holders both in the case of estates and small-holdings. The following Table shows the quantity applied for and the quantity actually issued in the year 1964 :—

	No. of Permit-holders	*Acreage in respect of which applications were received*	*Quantity of fertilizer applied for*	*Quantity of fertilizer actually drawn*
Estates	2,043	194,933	33,210	23,950
Small-holdings (direct)	17,257	89,102	24,038	15,452
Co-operatives	1,059	43,893	10,991	8,004

The following are the reasons attributed for the non-utilization of the permits :—

(a) Unstable weather and other climatic conditions prevailing at the time ;

(b) Temporary declines in market prices of coconut and coconut products ;

(c) Lack of credit facilities available to the proprietors of coconut lands.

66. Weather will always remain a hazard in agriculture. The fall in market prices has been mitigated to some extent by the sliding scale of duties on coconut. As regards credit facilities, this can be made available through the nationalised Banking services and through Co-operative Societies. However, this will require legislation and will take a considerable length of time. As an interim measure, it is recommended that coconut estates which now draw subsidy at 33⅓ per cent. be allowed a subsidy rate of 50 per cent. as in the case of small-holdings. It is estimated that this would increase fertilizer consumption by the estates sector by 10,000 tons annually. This will, of course, require additional funds.

67. Currently the Coconut Rehabilitation Department spends approximately Rs. 7.4 million on fertilizer subsidy as follows :—

	Quantity of Fertilizer distributed Tons	*Subsidized Rate*	*Total Subsidy (Rs. Million)*
Small-holdings (under 20 acres)	25,000	50% (Rs. 195 per ton)	4·4
Estates (over 20 acres)	25,000	33⅓% (Rs. 130 per ton)	3·0
			7·4

If estates are allowed to draw fertilizer at 50 per cent subsidy instead of the prevailing rate of 33⅓ per cent. fertilizer consumption on estates will be increased from the present 25,000 tons to 35,000 tons annually. The total annual cost to Government will be Rs. 11.1 million, as follows :—

	Quantity of Fertilizer distributed Tons	*Subsidized Rate*	*Total Subsidy (Rs. Million)*
Small-holdings (under 20 acres)	25,000	50%	4·4
Estates (over 20 acres)	35,000	50%	6·7
			11·1

68. If this recommendation is adopted, it would mean that an additional sum of nearly Rs. 3.7 million will have to be made available to the Department of Coconut Rehabilitation for subsidising fertilizer. This additional expenditure will be more than recouped by the increased production on coconut estates. At last year's average price (there was a sharp rise in average prices this year, which is being discounted for the purpose of this exercise), an acre of coconut land must produce an additional 380 nuts to recoup the entire expenditure on fertilizer. The Working Group on Coconut appointed by the National Planning Council in 1958, has estimated that the increase in the annual yield resulting from the increased use of fertilizer would vary from 500 to 1,000 nuts depending on the agricultural condition of the estate. This view has been confirmed by a recent survey undertaken by Mr. Shastri of the Food and Agriculture Organization, in which he has concluded that the application of the correct dosages of fertilizer would increase the productivity of coconut lands by figures varying from 20 to 30 per cent. As the annual yield level of estates was of the order of 2,500 to 3,000 nuts, this would confirm the earlier opinion that fertilizer could increase yields from 500 to 1,000 nuts per acre. It is evident, therefore, that the total expenditure incurred on fertilizer will be more than recovered by the increase in the annual output of coconut estates.

Replanting Superannuated Areas

69. Most of the Island's coconut palms are over 50 years of age and only a very few estate owners and small-holders have regularly replanted their worn-out coconut lands with young palms. No accurate data is available on the age of coconut palms now in production. If, however, the economic life of a coconut tree is assumed to be 60 years and the acreage in production is said to be 1.1 million acres, then approximately 1½ per cent. of the total area, or 17,000 acres approximately, should be replanted annually. This figure should be increased in the initial stages as there has been no systematic replanting programmes until recently. In view of the backlog, the annual rate of replanting should be around about 25,000 acres a year.

70. Unlike in the tea and rubber industries, genetically proven high-yielding varieties of clonal planting material have not been developed in the coconut industry. Seednuts are selected from high-yielding mother palms. Because the male parent is unknown and the female parent is in itself heterozygous, there is no guarantee that a genuine high-yielding palm will reproduce its performance in its progeny. It is not possible, therefore, to achieve, in the case of the coconut industry such spectacular increases in yield as are possible in the rubber and tea industries. The benefits are purely the result of the replacement of

senile palms with more vigorous, younger palms. The second part of the Rehabilitation Scheme is designed to encourage the replanting of worn-out coconut lands.

71. To enable owners of coconut lands to replace senile coconut palms the Coconut Research Institute issues high-grade seedlings, which cost about 85 cents to produce, at the subsidised rate of 25 cents each. The seedlings distributed under the Scheme are not used exclusively for replanting ; some of them are used for the supply of vacancies on coconut estates and small holdings and for the new-planting of coconut lands which previously did not carry coconut. On the basis of the number of seedlings distributed under the subsidised Seedling Distribution Scheme, the area catered for planting, replanting, filling of vacancies, etc. in each year since 1956 will be as follows :—

Year	*No. of Seedlings distributed*	*Approximate Acreage planted*
1956	900,000	15,000
1957	1,050,000	17,000
1958	1,175,000	19,600
1959	1,297,000	21,500
1960	1,322,000	22,000
1961	1,149,000	19,150
1962	1,140,000	19,000
1963	1,400,000	24,000
1964	1,292,000	21,000

72. Although the annual output of planting material is adequate to supply 20,000 acres, it would be incorrect to say that all the seedlings had been used to replant areas which give low yields owing to advanced senility. Even in those circumstances where the seedlings had been used for under-planting, there is no guarantee that the under-planting had been carried out on a systematic basis and has been maintained up to the required standard. This is particularly so in the case of small-holdings which constitute, as stated earlier, more than 70 per cent. of the land under coconut. The success of coconut under-planting depends on the following operations being carried out regularly during the early stages of the planting. The operations are—

(1) fencing,

(2) gradual thinning of the old stand,

(3) judicial application of fertilizer,

(4) care of seedlings against pests and diseases, etc.,

(5) systematic weeding.

If these operations are not carried out, a serious setback on the growth of young seedlings would occur, resulting in delayed flowering and the diminution of yields in course of time. Experience has shown that replanted areas suffering from such draw-backs in the early years, cannot easily be corrected thereafter to produce in later years the desired standards of growth and productivity.

73. It is clear that some form of additional inducements is necessary to ensure that under-planting is carried out and maintained up to accepted standards of cultivation. In fact, the earlier proposals made in the Coconut Commission Report (1949) and the Agricultural Plan (1958) was that apart from the supply of subsidised seedlings, agricultural implements and barbed wire should be sold at cheap and subsidised prices. Otherwise, costs would be heavy and disproportionate and the rehabilitation plans may collapse.

Alternatively, it is suggested that monetary inducements, in the form of replanting subsidies, be offered to owners of coconut lands who plant or under-plant their lands with high-yielding coconut seedlings. Such inducements will secure a systematic approach to the replanting of worn-out coconut lands with selected planting material and will ensure that the young plantations are maintained in a vigorous and healthy condition. It is recommended, therefore, that a Coconut Replanting Scheme, on the lines of the existing Tea and Rubber Replanting Subsidy Schemes, be launched by the Government.

Proposed Subsidy Scheme

74. The estimated cost of under-planting and new-planting an acre of coconut, using subsidised fertilizer, and bringing the area into bearing, is approximately Rs. 1,000 to Rs. 1,200 an acre.

	Replanting *Rs. c.*	*New-Planting* *Rs. c.*
1st Year	400 00	600 00
2nd Year	85 00	100 00
3rd Year	115 00	120 00
4th Year	140 00	150 00
5th Year	150 00	150 00
6th Year	150 00	150 00
	1,040 00	1,270 00

The estimate given above is an approximate *average* figure. The costs have been computed on the assumption that the average density of an old plantation is 64 palms an acre, and in under-planting, gradual thinning is done during the 1st, 3rd and 5th years, as stated elsewhere in this memorandum. It is not necessary for Government to give owners of coconut lands the full cost of under-planting or new-planting. It will be a sufficient inducement if a subsidy of Rs. 400 an acre is paid, in five instalments, as follows :—

(1) The first instalment of Rs. 150 an acre, after fencing, and planting of approved seedlings.

(2) The second instalment of Rs. 60 an acre one year after planting.

(3) The third instalment of Rs. 60 an acre two years after planting.

(4) The fourth instalment of Rs. 60 an acre three years after planting.

(5) The fifth instalment of Rs. 70 an acre four years after planting.

The final subsidy will be paid at the end of the fourth year after planting and before the palm comes into bearing. The young palm is relatively sturdy at this age and the fertilizer subsidy available under the Coconut Fertilizer Subsidy Scheme is a sufficient inducement to maintain the plantation in good condition thereafter.

75. The subsidies paid under the proposed Coconut Replanting Subsidy Scheme should, as in the case of subsidies paid under the Tea, Rubber and Cocoa Replanting Subsidy Schemes, be free from Income Tax.

76. On a rough estimate, it is expected that about 20,000 acres will participate annually in this Scheme. The annual cost of subsidies including the cost of administration, will be of the order of Rs. 10 million.

77. When the 20,000 acres which is replanted annually comes into full bearing, it should produce, on a conservative estimate, 60 million nuts every year, worth about Rs. 7 million at the price now paid to the primary producer. (The export prices will, of course, give a higher total value.)

Planting Material

78. As stated earlier, the Coconut Research Institute supplies seedlings to owners of coconut lands at the subsidised price of 25 cents each. The resulting loss is met by an annual grant of approximately Rs. 900,000 approved by Parliament. The contribution by Government is made to the Coconut Research Institute through the Coconut

and Cocoa Rehabilitation Department. The grants paid to the Coconut Research Institute since 1956 are as follows :—

Year	Grant Rs.
1957	850,000
1958	850,000
1959	850,000
1960	850,000
1961	1,000,000
1962	900,000
1963	900,000
1964	855,000

79. In the past, an average of 1.2 million seedlings were sold by the Coconut Research Institute annually. If the Coconut Research Institute is to cater to the replanting scheme (20,000 acres) and also to the public for filling of casual vacancies as in the past, then the demand for seedlings will be in the range of 1.6 million. The Coconut Research Institute estimates that it will be able to produce the necessary number of seedlings without any increase in the annual grant of Rs. 900,000.

Administrative Arrangements

80. Before subsidies for replanting of coconut are paid to permit-holders, it is necessary that the land be inspected and the quantum of work be checked by a reputed authority. The inspections of areas under the Rubber and Tea Replanting Subsidy Schemes are carried out by experienced Superintendents of large rubber and tea estates, who are paid for these inspections on a fee basis by the Rubber and Tea Control Departments. It is unlikely that Estate Superintendents with similar experience of coconut will be available for inspections under the proposed Coconut Replanting Subsidy Scheme. It will, therefore, be necessary to use the services of officers of the Coconut Research Institute who have technical knowledge of coconut planting to carry out these inspections. The cadre of the Coconut Research Institute will have to be increased in order to enable suitable officers to be recruited for this work. It is recommended that an outright grant of Rs. 300,000 be paid annually to the Coconut Research Institute by Government to meet the expenses of this additional staff, including travelling. This grant can be paid to the Coconut Research Institute through the Coconut Rehabilitation Department in the same manner as the coconut seedling grant is now paid to the Coconut Research Institute for the distribution of subsidised seedlings.

81. While the *technical* work in connection with this Scheme (raising of planting material, inspections, advisory visits etc.) would have to be undertaken by the Coconut Research Institute, the

administrative work connected with the Scheme (calling for applications, issue of permits, payment of subsidies etc.) would be handled by the Coconut Rehabilitation Department. (This division of duties is similar to that between the Coconut Research Institute and Coconut Rehabilitation Department under the existing Subsidy Scheme for replanting of Citronella lands in coconut). It is not easy to determine the exact increase in staff required by the Department, but on a rough assessment the cadre of the Coconut Rehabilitation Department will have to be strengthened by 30 to 40 officers of the clerical grade and at least two Staff Officers. The total annual emoluments on staff will probably not exceed Rs. 3 to 4 lakhs.

82. It is best that the Coconut Subsidy Scheme be given legal sanction through an Act of Parliament. The legal Draftsman should be authorised to draft a Bill providing for—

(*a*) the establishment of a Coconut Subsidy Fund ;

(*b*) the payment into the Fund such sums as are approved by Parliament ;

(*c*) the payment out of the Fund monies for rehabilitation of the coconut industry, in accordance with approved schemes of rehabilitation, to be embodied in regulations under the Act ;

(*d*) the appointment of an Advisory Board for the general supervision of the Coconut Subsidy Scheme ;

(*e*) the auditing of Accounts by the Auditor-General ; and

(*f*) the functioning of the Scheme under the general direction and control of the Minister of Agriculture and the framing of Regulations under the Act.

83. The total cost of the Coconut Replanting Scheme, including the cost of administration, will be of the order of Rs. 10 million annually, provided the target annual acreage of 20,000 acres is reached. The expanded Fertilizer Subsidy Scheme will cost Rs. 11.5 million annually, as stated earlier. The total assistance earmarked for the rehabilitation of the coconut industry will be about Rs. 21 million a year for the next five years, 1966-1970 :—

		Rs.
Coconut Fertilizer Subsidy Scheme		**11·5 million**
Coconut Replanting Subsidy Scheme :	**Rs.**	
Seedling subsidies	**0·9 million**	
Replanting subsidies	**8·0 "**	
Administration (including inspections) ..	**0·7 "**	**Rs.**
		9·6 million
	(say)	**21 million**

Production Targets

84. As indicated in an earlier paragraph, present production is in the region of 2,800 million nuts per year for the three-year period ending 1964. Under the proposed expanded Rehabilitation Programme, however, the average annual output during the three-year period ending 1970 is estimated to be in the region of 3,200 million nuts. This projected increase of approximately 14 per cent. over present production levels may appear small when compared to the projected increases in the other commercial crops. However, it has to be remembered that since the coconut palm takes approximately 7 years to come into bearing after planting, the benefits of the replanting envisaged under the expanded Coconut Rehabilitation Scheme during this five-year period will actually be seen as far as increased production is concerned, only after 1970. Nevertheless, the projected increased production during the five-year period ending 1970 clearly justifies the increased investment in the coconut industry. It must also be noted that the 100,000 acres to be replanted under the expanded Rehabilitation Scheme will after it comes into full bearing, produce approximately 300 million nuts per year.

Estimated Production

Period	*Average annual Local consumption (Estimated)*	*Average annual Exports (Estimated)*	*Average annual Production (Estimated)*
	(In Millions of Nuts)		
1965–67	1,458	1,542	3,000
1968–70	1,581	1,619	3,200

COCOA

An Extended Cocoa Planting Subsidy Scheme

85. There are about 80,000 acres of uneconomic rubber land in the Kandy, Matale and Badulla Districts, which are not suitable for replanting with high-yielding strains of rubber and which must, therefore, be replaced by alternative crops. A scheme for planting these worn-out rubber lands in cocoa was put into operation by the Department of Agriculture in 1956. Under this scheme, subsidies were paid to proprietors of marginal rubber lands over 1,200 feet in

elevation, but subsequently extended to all rubber lands irrespective of elevation, as follows :—

SCHEME A—A subsidy of Rs. 450 an acre, payable in five instalments of Rs. 90 each, where the owner of the land retains the old rubber as shade for a period of two years or so while the under-planted cocoa establishes itself.

SCHEME B—A subsidy of Rs. 600 an acre, payable in four instalments of Rs. 150 each, where the owner of the land removes the rubber and establishes alternative shade prior to the planting of cocoa.

86. Permits covering an extent of 7,607 acres were issued by the Department of Agriculture under the scheme during the five-year period 1956-1960. Of this extent, more than 25 per cent. of the acreage covered by the permits had to be cancelled because of the unsatisfactory work done by the permit-holders. The issue of new permits for planting of cocoa was administratively suspended in 1961 on the advice of the Cocoa Rehabilitation Advisory Committee. The payment of the balance subsidies due on the permits issued by the Department of Agriculture, however, continue to be made by the Department of Agriculture.

87. The financial commitments and the actual payments made by the Department of Agriculture in respect of permits already issued under the scheme are as follows :—

	Acreage covered by the permits	*Total Commitments*	*Payments already made*	*Balance monies required to complete payments*
		Rs.	*Rs.*	*Rs.*
Scheme A ..	6,718 ..	2,412,000 ..	1,968,000 ..	443,000
Scheme B ..	888 ..	401,000 ..	313,000 ..	89,000

Provision for the payment of the balance instalments is made under Head 135, Department of Agriculture, Vote No. 7, Sub-head 9—Cocoa Planting Subsidy Scheme, in the current year's Estimates.

88. With the suspension of the Scheme, the last five years has seen a general deterioration of the agricultural condition of the marginal rubber lands. Early steps must be taken to rehabilitate these holdings by replacing the rubber with suitable alternative crops. Part of these lands can be cultivated in tea, and part of the remainder in cocoa.

A Rubber into Tea Replanting Scheme under which it is intended to plant up about 8,000 acres of worn-out rubber in tea has already been introduced by the Government. The lands falling within the Matale and Kandy Districts are extremely well suited for the growing of cocoa. In fact, the existing cocoa in Ceylon is situated in adjoining areas of the same two districts. It is, therefore, proposed to re-open the Scheme for planting cocoa in marginal rubber lands, which was suspended in 1961. The administrative work connected with the Scheme, however, should be transferred to the Department of Coconut and Cocoa Rehabilitation and only the technical aspects of the Scheme will be left to the Department of Agriculture. Before discussing the details of the transfer and the revised programme of work, it is pertinent at this stage to make a brief reference on the prospects for cocoa in view of the recent slump in world cocoa prices.

89. At present, the bulk of the world's cocoa comes from Ghana, Nigeria, the West Indies and certain parts of tropical America. Ghana and Nigeria together supply half the world's demand—the economies of these two countries are heavily dependant on cocoa and they have made large investments to increase the output of cocoa. The world's price of cocoa has been notoriously unstable. When disease affected the West African crop in 1956 and tended to shrink supplies, the world's price of cocoa soared to a peak price of £467 a ton. Since then prices have fallen to £ 190 a ton last year and collapsed to the current price of £97 a ton, which is almost half the previous lowest price since 1945. It is worth mentioning that the financial basis of Ghana's Seven-Year Plan was calculated on an assumed average price of £190 a ton for its cocoa.

90. The decline in prices is a result of soaring production rather than sagging consumption. The world's demand has risen since 1956 from 830,000 tons to 1,300,000 tons. But production, which was lagging behind supplies in 1956, is expected to reach 1,500,000 tons this year, thereby causing a surplus. Many factors have contributed to this excess production. The heavy investments by the farmers and the producer countries in extensive cocoa cultivation, the introduction of quickly maturing, high-yielding, disease-resistant strains of cocoa and the judicious removal of shade, have all led to surplus in production which, in turn, depressed prices to uneconomic levels. Ghana even had to set fire to a considerable quantity of cocoa in an attempt to control the downward drift in prices by withholding supplies from the world market. The depressed prices for cocoa have had a disastrous effect on the economies of the cocoa producing countries

The producer countries have, in fact, tried to form an alliance of their own to keep up sagging prices, but this has failed. Efforts to hammer out an International Cocoa Agreement has met with no success. A Conference held in July, 1965, under U.N. auspices between major cocoa producers and the major Western consumer countries broke up without any firm proposals.

91. These considerations, no doubt, make cocoa a chancy crop and it might be argued that it would be unwise for Ceylon to invest in an export crop where surpluses are already burdening the producing countries. The view of informed observers, however, is that the current poor prices will inevitably lead to drastic declines in production. At the present crop prices, fertilizers are unlikely to be economic and even disease-control will suffer. Since cocoa is a disease and weather prone commodity, this is bound to affect yield and production of future crops. Moreover, the incentives and price supports have already been slashed or withdrawn by the Governments of producer countries. The net result is likely to be a fall in production with a possibility of a consolidation of the market prices at a reasonable level.

92. Further, Ceylon caters to a different market than the West African variety and hence the competition is less severe than it appears. In fact, Ceylon cocoa is more carefully prepared, is fresher and fetches a premium over the West African variety. Ceylon's best market for several years has been the Philippines for which an under-fermented pink cocoa was specially developed. Less cocoa now goes to the Philippines and more cocoa from Ceylon finds its way to Japan, Italy, U.S.S.R. and Poland for chocolate manufacture. This is the market which has to be developed for the future.

93. The production of cocoa in Ceylon has, on the average been approximately 50,000 cwts. a year. Almost the entire production was exported upto a couple of years ago when the imports of confectionery and chocolates were banned. During this period, several factories for the manufacture of local chocolates and confectionery were set up. The off-take of domestic cocoa by these manufacturers in 1964, according to returns furnished by them to the Commissioner of Coconut and Cocoa Rehabilitation, is estimated at 7,500 cwts. The quantity exported in 1964 was 39,000 cwts. at a f.o.b. valuation of approximately Rs. 6.3 million. The exports represent less than one-sixth per cent. of the world's supply of cocoa.

94. While the prospects for large-scale cultivation of cocoa are admittedly dubious, there is scope for the development of a restricted acreage under cocoa. The targets that are being drawn up take into

consideration the above factors. When the scheme for the subsidise planting of cocoa on marginal rubber lands was launched in 1956, was estimated that possibly 30,000 acres out of the extent of 85,00 acres of marginal rubber land would participate in the Subsidy Scheme. These expectations were not fulfilled owing to the limite funds that were put at the disposal of the Department of Agricultur The applications received under the Scheme in each year since 195 covered an area greatly in excess of the area for which funds were available and eventually only 6,000 acres were planted in cocoa Judging by the present market trends, however, it is doubtful if planting target of more than 1,000 acres a year can be achieved whe the Subsidy Scheme is re-opened. Even if the area covered by th applications exceed this figure, it is recommended that for the ne five years, 1966-1970, only a total of 5,000 acres of marginal rubbe land should be planted in cocoa.

95. The earlier rates of subsidy of Rs. 450 and Rs. 600 an acr should be revised as they are no longer a sufficient inducement fo owners of worn-out rubber lands to plant their lands with coco Since October, 1964, the Department of Coconut and Cocoa Rehabilitation has been operating a Cocoa Replanting Scheme, under whic a cash subsidy of Rs. 850 an acre is given for replanting old coco plantations with high-yielding and disease-free strains of cocoa. Sinc the cost of planting cocoa on old cocoa lands is substantially the sam as planting cocoa on worn-out rubber lands, *it is suggested that th rate of subsidy in the latter scheme be increased to the level of th former scheme, i.e. Rs. 850 an acre.* Further, it is recommended th both these Subsidy Schemes be administered by the Department o Coconut and Cocoa Rehabilitation. All subsidy payments stil remaining to be made on permits issued earlier by the Departmen of Agriculture will, however, be continued to be made by th Department of Agriculture. The Department of Coconut and Coco Rehabilitation will administer the scheme in respect of new permit issued by the Department under the Scheme at the revised subsid rate of Rs. 850 an acre.

96. To get a complete picture of the financial implications of th Cocoa Planting and Replanting Schemes, it is necessary to briefl review the progress made under the Cocoa Replanting Scheme. Wh this Scheme was first placed before the Cabinet in 1963, it w estimated that about 9,000 acres of old cocoa land could be replant within the remaining period of the Government's Ten-Year Pl

period ending 1968. The Cabinet approved the Cocoa Replanting Scheme at a total cost of Rs. 8.5 million, made up as follows :—

Subsidies for 9,000 acres at Rs. 850 per acre ..	Rs. 7·65 million
Cost of administration	Rs. 0·85 "
	Rs. 8·50 million

It was expected that about 1,500 acres would participate annually in the Scheme commencing 1963, but since the approval was obtained only in 1964, the target rate had to be stepped up to more than 2,000 acres a year. Applications were invited in November, 1964, but the response has been poor as the following figures indicate :—

	No. of Applications	*Acreage covered*
Applications received ..	203 ..	947 acres
Permits issued	136 ..	540 "

Very few large estates have participated in the Scheme and almost all the permits have been issued in favour of small-holders. Part of the reluctance of estates to join the Scheme was due to the proposals made in the 1964 Budget that all replanting subsidies should be treated as income and therefore liable to income tax. With the dissolution of Parliament in December, 1964, this proposal was not implemented. Although this concession of keeping the subsidy free of tax has been assured, it is doubtful whether a replanting target of 1,000 acres can be maintained for the next five years, 1966-1970. On this basis the revised estimates of expenditure for the planting of cocoa in marginal rubber lands and the Cocoa Replanting Scheme will be Rs. 10 million for the Five-Year period 1966-1970 :

Cocoa Replanting Subsidy Scheme :	
Subsidies for 6,000 acres at Rs. 850 per acre	Rs. 5·1 million
Cost of administration	" 0·3 "
Cocoa Planting Subsidy Scheme—(on marginal rubber lands) :	
Subsidies for 5,000 acres at Rs. 850 per acre	Rs. 4·3 million
Cost of administration	" 0·3 "
	" 10·0 million

97. While under favourable weather conditions mature cocoa has given yields of over 10 cwts. in Ceylon, under average conditions it would be safe to assume an annual yield of 3½ cwts. an acre from

cocoa. When the area of 11,000 acres of newly-planted cocoa comes into full bearing, it should produce, on a conservative estimate, nearly 40,000 cwts. of cocoa annually, worth Rs. 5.2 million at today's depressed price for cocoa.

98. The administration of the revised Cocoa Planting Subsidy Scheme will require only a slight increase of clerical staff over and above that originally sought by the Department of Coconut and Cocoa Rehabilitation for the implementation of the Cocoa Replanting Scheme. While all the administrative work connected with the Scheme (registration of lands, calling for applications, issuing of permits, payment of subsides, etc.) would be handled by the Department of Coconut and Cocoa Rehablitation, the technical work such as raising of selected planting material, inspections and advisory visits would have to be undertaken by the Department of Agriculture. This is the same division of work which was approved for the Cocoa Replanting Scheme under the earlier Scheme. The Agricultural Department was authorised to increase its cadre by 6 or 8 Agricultural Instructors to be trained for this work. This complement of staff is considered adequate to tackle the revised programme.

99. The administration of the entire Cocoa Subsidy Scheme can be taken over immediately by the Department of Coconut and Cocoa Rehabilitation as no additional funds will be required for the current financial year because the expenditure during this period will be confined largely to preliminary expenses such as advertisement, stationery, printing charges, transport registration, issue of permits, etc. It is only after Planting Permits are issued that owners can commence planting operations. This will take time and hence only a very few subsidy payments will fall due in the current financial year itself. These preliminary expenses can be met from savings in Head 138, Vote 7, Sub-head 12—" Grant to the Cocoa Replanting Subsidy Fund for subsidising the replanting of old and diseased cocoa plantations with young, vigorous and disease-free strains and for the employment of staff connected with the Scheme. "

Research Programme of the Tea Research Institute

RESEARCH PROGRAMME OF THE TEA RESEARCH INSTITUTE

Objectives

The Chief objective of Agricultural Commodity Research must always be the mundane one of increasing profits per acre from the crop under investigation. The Tea Research Institute of Ceylon is trying to do just this for the industry by a down to earth policy using the following three pronged attack. Firstly by increasing yields, secondly by improving quality and thirdly by reducing expenditure. This policy is being implemented by research programmes of a short, medium and long term nature in the following subjects—Soil and Plant Chemistry, Agronomy, Horticultural Botany, Plant Physiology, Plant Pathalogy, Nematology, Entomology, Bio-chemistry and Factory Technology. Covering all these activities is the fundamental discipline of Mathematical Statistics—the universal tool or research workers.

Increasing Yields

It is well known that every single operation connected with tea is controversial and that there are almost as many right ways of doing things as there are planters. As far as tea is concerned truth is many-sided and the search for what is best in all circumstances will go on for ever. Meanwhile the results of over 40 years of experimentation have given the tea industry of Ceylon a solid foundation for rational estate operations. The work of the Institute on fertilizers has culminated in their vast consumption by the tea industry with corresponding increases in crop. Even greater increases are anticipated over the next decade when thousands of acres of high yielding clonal tea will come into bearing. The yield potential of this tea is of the order of 6,000 lb. made tea per acre, but to achieve this, very heavy dressings of fertilizer must be applied. Amounts of nitrogen up to 500 lb. per acre are involved and much detailed experimentation is going on to obtain the maximum amount of tea per pound of nitrogen applied. This study involves the balance of nitrogen with other nutrient elements such as potassium, phosphorus, calcium, magnesium and sulphur and the trace elements manganese, boron and zinc. In connection with the last element the Institute has recently demonstrated that a highly profitable response can be obained by spraying tea bushes with only 10 lb. per acre of zinc sulphate. This gave a yield increase of 10 per cent. which might be more than the increases produced by all the other fertilizers applied together.

Following on this, it must be emphasized that it is highly improbable that yields above 3,000 lb. per acre will ever be obtained from stands of old seedling tea no matter how well fed they might be. The ultimate in yield will only be reached with clonal bushes or from their seedling progeny; so far, clones selected by the T.R.I. are outstanding. The 2,020 series of clones might almost be termed 'golden bushes' because they do so well under all the ecological regimes in which tea is grown in Ceylon. Naturally their individual characteristics vary but their yield potential is approximately the same. Seedling progeny from crosses between these clones offer an even more promising, albeit long-term approach to maximal yield.

Removing Adverse Factors

One way of increasing profits in agriculture is the obvious one of removing those factors which are reducing them. In Ceylon there are many such factors, which if not kept under control would not only have reduced profits to nil but would probably have wiped out the industry altogether. The T. R. I. is justly proud of its role in saving the industry from the fate which overcame the coffee industry 90 years ago. During the year following October 1946, every estate was affected by the invading Blister Blight fungus *Exobasidium vexans Massee*. During the following year methods were worked out, largely by the T. R. I., to control this disease effectively with copper sprays. From then on, economies in spraying costs have been made by using motorized sprays and timing applications carefully in relation to hours of sunshine. Another serious fungus disease in up-country tea is "Red Root" (Poria), but T. R. I. workers have found the answer to this in soil fumigation. The same answer applied to the control of a more widespread pest-meadow eelworm. In this case the T. R. I. has found that a considerable measure of control can be obtained by planting Guatemala grass for up to two years prior to replanting tea.

Insect pests could have been nearly as devasting to Ceylon tea as the fungus diseases. By far the worst is shot-hole borer which is prevalent in the low and mid-country estates. If the T. R. I. had not found an effective means of control by spraying, tea in these areas would have been derelict by now. Unfortunately spraying sometimes kills parasites of the Tortrix moth—another, but less serious tea pest and so depredations from this often follow shot-hole borer control. However, other sprays were soon found to take care of Tortrix. But yet other pests may follow, such as red spider and scarlet mites. Again control measures have been worked out by the T. R. I. Concurrently with chemical control, which is immediately effective, even if it does have troublesome side issues the T. R. I. is ever mindful of the need for biological control methods, although these mean very long-term research activities.

Improving Quality

Just as the ultimate in yield will be given by clonal bushes, even more so is this true when quality is considered. Flavour, quality and ability to make tea easily (fermentability) are part of the genetic make-up of each bush in more or less degree. The selection of bushes with the highest abundance of these desirable features is the objective of the Plant Propagation Division of the T. R. I. Coupled with selection for highest yield, this should lead eventually to clones even more 'Golden' than the 2,020 series.

Despite the fact that quality is inherent in most good clones it is no use having quality unless it can be used to the full, so as to give more profit to the grower. To exploit quality to its utmost, factory processes must be so geared that none of it is lost on the way to making saleable tea. Much research is going on at the T. R. I. in improving factory processes and thereby giving quality its full share in increasing profits per acre. Concurrently with factory investigations a very intensive research programme is being conducted on the intricate biochemistry of tea manufacture—all aimed at improving the final product. Biochemical studies are not confined to factory processes but they go right back to the growing bush. This may seem very long term research but it is a subject that will pay off handsomely in the long run.

Reducing Expenditure

Reducing expenditure is an exercise of which managements are ever conscious, especially in these days of continuously rising costs. All the time-honoured practices involved in the growing of tea are coming under the close scrutiny of the T. R. I. scientists. Prominent among these practices are pruning, tipping and plucking, the fundamental study of which is engaging much time of the Plant Physiology Division. This Division is also intimately concerned with the vexed question of shading tea. Shade trees over tea are very costly to plant, costly to maintain and even more costly to remove. A mass of scientific evidence is building up from many countries against shade for plantation crops. Shade over tea in East Africa and Ceylon reduces yield, it reduces quality and it reduces response to nitrogen. The tempo of experimentation on the economics of shade is being stepped up by the T. R. I. because if all the results obtained elsewhere can be shown to apply in Ceylon, millions of rupees would be saved. The mulching value of shade-tree leaves has been shown to be ver doubtful and even non-existent in the case of Grevillea. Since th leaves and twigs of tea bushes are extremely rich in nitrogen an potassium, it would seem that the best mulch for tea is tea. Th brings us to yet another old and controversial point with which th T. R. I. is much concerned, that is the removal and burning te prunings. On mid and up-country estates these are burnt b labourers as domestic fuel. A full assessment of the loss of valuabl plant nutrient is being made, first indications are that the Island's te fertilizer bill could be affected to the tune of millions of pounds sterling and that this enormous sum could be saved if means were devise to return prunings to the soil.

All over the world the challenge of weed control is being met b chemicals. There are at least a dozen effective ones for specific grou of weeds and specific methods of control. The T. R. I. has been rathe conservative on this subject in the past but the needs of the industr are becoming so urgent, especially in low and mid-country district that at least two full time research workers will soon be dealing with herbicides.

Advisory Services

Following Assam experience, the Tea Research Institute of Ceylon i building up an efficient advisory service to deal with the day-to-day queries of planters.. Information is fed into the Advisory Division from the Research Divisions; and also the Advisory Division in collaboration with the Research Divisions is helping to improve the premises on which its advice is based by a comprehensive programme of field experimentation. The production problems of the Ceylon Tea Industry are fully covered by the programme outlined below :

AGRICULTURAL CHEMISTRY DIVISION (INCLUDING FORMER AGRONOMY DIVISION)

Field Experiments

1. Developments of fertilizer experiments on St. Coombs, St. Joachim and sub-stations, to investigate effects of fertilizer levels and types and efficiency of methods of application. Particular reference to yield response, with provision for manufacturing tests. These are long-term projects and lay the foundation for precise investigations for 10-20 years hence.

2. Detailed experiments on fertilizer application to young tea with particular reference to placement at the time of planting. This programme also covers various centres of Institute land.

3. Methods of soil rehabilitation will be studied, with reference to fertilizer application and weed control.

4. Chemical weed-control problems, will be investigated and the intensity of the programme will increase once staff have been cquired.

5. Estate Extension Experiment scheme. The fertilizer investigations in the scheme are co-ordinated from this Division. They are complimentary to the more detailed experiments outlined in 1 and aim to speed up the provision of firm advice to estates in different tea-growing districts.

Laboratory investigations

6. Field experiments require chemical analysis as an aid to interpretation of results, and to assist in using these results to predict the pattern of future experiments. The intensity of laboratory analysis will increase as the number of field experiments increases. Eventually it is hoped to be able to use properly calibrated chemical analysis techniques as a direct tool in offering advice on fertilizer problems to estates.

PLANT PROPAGATION DIVISION

1. *Vegetative Propagation of Tea*

Studies in VP nursery techniques at St. Coombs (Up-country) Hantane (Mid-country wet zone), Passara (Mid-country semi-dry zone) and Kottawa (Low-country).

2. *Clonal Proving Trials*

These have been set down annually since 1961 to test the performance of promising T. R. I. and estate clones under different soil and climatic conditions over 85 clones are under test.

3. *Bringing into Bearing*

Studies on effect of treatments such as thumb-nailing, cut-across, bending, etc. on growth or yield of the clones in the field.

4. *Plant Breeding*

Controlled pollination between selected clones for production o generative clones yielding good biclonal seed and superior vegetativ clones.

LOW-COUNTRY STATION, ST. JOACHIM

1. The day to day organization and running of all the experiment of the various divisions of the T. R. I. in the Low-country bot on St. Joachim Estate and other estates.

2. General overlooking and administration of laboratory work i the new St. Joachim laboratories.

3. This work is an integral part of the work at St. Coombs and i planned by the heads of divisions in consultation with the Low country Research Officer.

PLANT PHYSIOLOGY DIVISION

General

The division of Plant Physiology studies the development an functioning of the tea bush in the field and the laboratory in way which will clarify the basic principles underlying the production o this particular crop.

Main Lines of Study

1. Patterns of total dry matter production in relation to certai cultural operations.
2. Study of factors related to the growth of individual shoots.
3. The analysis of components of yield in established tea.
4. Patterns of root development and growth.
5. Bringing-to bearing in relation to growth.
6. Plucking practices in relation to productivity.
7. Conditions responsible for, and methods of ensuring mo satisfactory recovery from pruning.
8. Shade as a factor regulating physiological activities.

NEMATOLOGY DIVISION

Pratylenchus loosi (root lesion nematode)

1. Selection and testing of clones for resistance to *P. loosi*.
2. Control of *P. loosi* in the nursery.
3. Incidence of nursery infestation in tea estates.
4. The effect of soil rehabilitation on nematode numbers.
5. The effect of methods of uprooting tea on nematode numbers.
6. Population increase of *P. loosi* after replanting.
7. Physiology of clonal resistance to *P. loosi*.
8. Biological strains of *P. loosi*.

Meloidogyne brevicauda (root-knot nematode)

9. Host range.
10. Resistance of tea clones.
11. Environmental factors influencing infestation.

Pratylenchus curvidatus (pin nematode)

12. Pathogenicity and ecology.

Phloem necrosis Virus

13. Investigation of transmission of virus by nematodes.

PLANT PATHOLOGY DIVISION

Blister blight (*Exobasidium vexans*)

1. Chemical control.
2. Epidemiology.
3. Physiological studies.

Root diseases (*Poria hypolateritia and other fungi*)

4. Chemical control.
5. Biology of casual fungi.

6. Resistance of clones.
7. Influence of shade trees.
8. Microbiology of fumigated soils.

Collar and branch canker (*Phomopsis theae*)

9. Biology of *P. theae.*
10. Factors influencing outbreaks.
11. Resistance of clones.
12. Control.

Oilspot Disease

13. Etiology.
14. Control.

Maintenance leaf fall

15. Etiology.
16. Control.

Phloem Necrosis Virus

17. Method of spread.

Ambrosia Fungus (*Monacrosporium ambrosium*)

18. Relationship between fungus and Shot-hole Borer.
19. Growth in tea at different stages of pruning cycle.
20. Effect on tea.
21. Control.

Red Rust (*Cephaleuros paraciticus*)

22. Biology.
23. Control.

ENTOMOLOGY DIVISION

Shot-hole Borer

1. Chemical control and related insecticide studies (mode of action, etc.)

2. Biology, dispersal and population studies.

3. Effect on tea yields and interaction effects with shade and fertilizer.

4. Survey of borer incidence.

Tea Totrix

5. Chemical control.

6. Studies of the side-effects created by spraying dieldrin and other insecticides.

7. Population studies including natural mortality factors such as arval parasitism and diseases.

Mites

8. The effect of insecticides and fungicides on mite numbers.

9. Effect of attack on tea yields and interaction effects with shade and fertilizer.

10. The etiology of mite damage to the plant, and effect on growth.

Other pests (White grubs, Nettle grubs, Looper, Scale insects, etc.).

11. Studies on biology and chemical control to cope with urgent problems.

BIOCHEMISTRY DIVISION

1. *Investigations of the effect of environment on tea plants.*
   - (a) Study of relation between environment and levels of selected enzymes and chemical constituents.
   - (b) Study of the relationship between metabolic patterns and environment.

2. *Investigation of photosynthetic assimiliation of carbon dioxi by the plants* (Use 14 Co2).

- (*a*) Determine the photosynthetic capabilities of the vario green parts of the tea plant.
- (*b*) Study the products of photosynthetic activity as a functio of time and physiological age.
- (c) Effect of environment on photosynthesis.

3. *Investigation of biosynthesis of constituents of tea plan important for growth and in tea manufacture.*

- (*a*) Polyphenolic compounds.
- (*b*) Organic nitrogen compounds.
- (c) Others.

4. *Investigation of the biochemical basis of the quality potenti of tea plants.*

BIOCHEMISTRY (TEA MANUFACTURE) DIVISION

1. *Flavour of tea.*

- (*a*) Separation and identification of the steam-distillate an either-soluble components of black tea.
- (*b*) Study of the precursors and development of flavour durin manufacture.
- (*c*) Effect of different methods of manufacture on flavour.

2. *Enzymes of tea.*

- (*a*) Separation and identification of the enzymes of tea at differen stages of manufacture.
- (*b*) Tissue culture of tea callus, study of the enzymes therein and the effect of cultural conditions on these enzymes.

3. Coenzyme. A levels of tea growing under different conditions.

4. Variations with season of amino-acids and different groups polyphenols.

5. Effect of fertilizer levels on polyphenols, amino-acids, quality an valuation of teas (in collaboration with the Technology an Agricultural Chemistry Divisions).

6. Study of the purines, phrimidines and phosphate ester appearing during tea manufacture.

7. Identification of the true tannins of tea and their effect on manufacturing processes.

8. The biochemical basis of the clonal preferences of insects (in collaboration with the Entomology Division .

TEA TECHNOLOGY DIVISION

1. New machines and ideas have recently been introduced into tea manufacture in order to improve quality, cut operating costs and to put production on a continuous footing as opposed to the batch-wise orthodox system of manufacture.

2. Long-term research over the next five years at St. Coombs and also at St. Joachim will consist mainly in developing these ideas to a fuller extent. These projects will cover various aspects of triturator, rotorvane and CTC manufacture, trough and trolley fermenting and trough withering.

3. Towards the end of 1968 the department hopes to be in a position to commence design and development work on new tea machinery. The first project on these lines which we hope to handle, is the design and construction of a fluidised bed tea drier. If all goes well we should reach the pilot project stage by the end of 1970.

4. Clonal work will proceed as usual. This work will be extended to St. Joachim and also to the sub-stations at Kottawa, Passara and Hantane.

STATISTICS DIVISION

1. Uniformity trials on clonal tea—the relative efficiencies of plot size, calibration, arrangement of plots, etc.

2. Trials on estates—their designs and analyses.

3. Initiation of sampling surveys of tea with special reference to losses due to eelworm in collaboration with Nematology Division.

4. Studies in statistical estimation of the residual effects of Nitrogen in collaboration with the Agricultural Chemist.

5. The combination of results of a series of experiments conducted over a number of years in different locations ; methods of combination ; tests of consistency of treatment effect, etc.

6. Sequential Experiments.

ADVISORY DIVISION

Recurring Work of a Routine Nature

1. Correspondence and estate visits. Testing of samples.

2. District P. A. Symposia on topics of current interest.

3. Exhibitions and Shows, international and local. (Colombo, Gall Nuwara Eliya and elsewhere. Also for Universities, Schools and othe technical Institutions).

4. Instruction and short talks on tea cultivation and manufacture fo groups of Trainees and students visiting T. R. I. and sub-station Scope of these is limited to extent of available current facilities an is carried out in co-operation with research divisions.

5. Production and revision of Advisory Literature. An importan programme to receive major priority, and to continue throughout th period, in co-operation with research divisions.

6. Extension Experiments on Estates. An immediate large expansio in numbers during 1966. Thereafter continuation and revision as th current situation demands. Carried out in co-operation wit principally Agricultural Chemistry and Physiology Divisions.

Envisaged for 1966 1967

7. Establishment of Museum at St. Coombs.

8. Establishment and Development of District Advisory Section a Hantane.

Research Programme of the Rubber Research Institute

Research Programme of the
Rubber Research Institute

RESEARCH PROGRAMME OF THE RUBBER RESEARCH INSTITUTE

THE Rubber Research Institute of Ceylon is guided on matters of long-term Research by Policy decisions reached from time to time at meetings of the Board of Management.

The Research Programme for the next 5 years as set down below, therefore, is limited by present Policy decisions, and may either be expanded upon or cut down in the future.

Before I give details of the envisaged Programme of Research, it would be worth while remembering that with a perennial crop such as Rubber, once an ambitious research programme is set down, most of the work in the years to come would be on continuing lines of research. And there is no doubt that even continuing lines of work will yield more and still more useful information in the future.

Botanical and Plant Breeding Section

During the next five years the Botanical Section will concentrate mainly on the testing of new clones, yield trials, inter-cropping trials, tapping experiments, the use of yield stimulants for increased yields and stock selection. The programme of laboratory work will be based on problems that are of immediate practical importance to the Industry.

The annual breeding programme of the Plant Breeding Section will result in the evolution of a large number of new clones. These will have to be tested by statistically designed trials for their yield and other secondary characters, before they are finally recommended for commercial planting. Considering the time that is normally required for the complete testing of a clone, a considerable expansion in the Botany Section's experimental areas is anticipated.

Yield trials form the final stage in the testing of promising clones before they are recommended for commercial planting. It is proposed to set down such yield trials in different planting districts, so that in future, lists of clones that are most suitable for each planting district would be available. In order to implement this programme it would be necessary to obtain the co-operation of estates so that suitable areas would be available in different districts for the setting down of these trials.

The possibility of inter-cropping rubber with other subsidiary crops including cinnamon will be explored. This is of special importance in the case of marginal areas where the climatic conditions are not favourable for the best growth and yield of rubber. It may be possible with the introduction of inter-cropping, to rehabilitate at least some of the old rubber lands that are on the verge of being abandoned in the drier planting districts.

A few experiments have already been initiated to investigate the possibility of reducing tapping costs. Further experiments await the availability of suitable areas. Owing to lack of suitable areas at the Institute's Experimental Stations it is anticipated that future tapping and yield stimulation experiments will have to be sited on commercial estates. This is likely to result in the necessity for a further increase in travelling facilities for the field staff.

A considerable amount of work has still to be carried out on the use of stimulants for increased yields. We still do not have data on the long-term effects of stimulation on growth and yield. Experiments will have to be initiated to assess any possible interactions of stimulation with the different tapping systems and with different climatic conditions. Lack of suitable experimental material has again so far been one of the limiting factors.

The clone Tjir. 1 is no longer recommended for commercial planting in Ceylon although Tjir.1 clonal seedlings continue to be used as stocks for budgrafting. It has therefore become necessary to investigate other sources of material for future use as stocks. It is also proposed to set down experiments to investigate the possibility of improving growth as well as yield by improving the quality of stocks.

With the annually increasing number of new clones, it is anticipated that the present system of identifying clones on vegetative characters would be subject to certain limitations when applied especially to clones derived from closely related parents. Laboratory techniques for identification of clones based on anatomical and physiological characters would be investigated. With the return of the Assistant Botanist after his training, other problems connected with tapping, bark renewal, propagation and yield will be investigated.

The Plant Breeding Section has already included the major lines of anticipated research during the next five years as part of its research programme for 1965.

With the recruitment of extra staff however an intensification and expansion of research on the cytogenetics of rubber as well as the breeding of disease resistant varieties is anticipated during the next five years.

In order to make available to the Plant Breeding Section for selection, a much broader spectrum of variability, it is hoped to import more genetic material from overseas during the next five years, after personal selection by the writer.

A start will also be made on the quantitative genetics of *Hevea*. We do not have any genetic parameters for selection worked out as yet in rubber, and this has been a practical disadvantage in selecting for improved yields. With the return of the Statistician from overseas training and the training of the assistant Plant Breeder overseas on this aspect of breeding, a start will be made on this very important line of research.

Plant Pathology Section

The main lines of laboratory research that will be carried out in the plant pathology section during the next five years would be, fundamental studies on the biology of *Hevea* pathogens, studies on the anatomy and biochemistry of the host, and host-parasite relationships. These studies are expected to help in devising more effective and economical methods of controlling the diseases of *Hevea.*

Studies will be carried out on the biology of bark, leaf and root disease fungi. The results of these studies should provide a firm basis for investigations on the chemical control of diseases and the breeding of disease resistant clones. Fungal associations and antagonisms in the soil will be studied with a view to divising methods of biological control of *Fomes lignosus*. The studies on the biology of *Oidium heveae, Gloeosporium alborubrum* and *Phytophthora palmivora* will be continued. New fungicides will be screened in the laboratory and in the field to establish whether any newly developed fungicide can be successfully used for disease control in *Hevea.*

Studies on the anatomy and biochemistry of the host will be carried out to establish whether there is any correlation between the biochemical composition of the host and resistance to diseases. The results of these tests should help in the early screening of new clones for disease resistance, and in the breeding of new clones for the same purpose.

Host-parasite relationship studies too would help in the early screening of clones for disease resistance.

The major part of the studies that will be carried out in the greenhouse will consist of pot experiments on the nutrition of *Hevea*, to ascertain whether there is any correlation between nutrition and susceptibility or resistance to disease. Preliminary tests will be carried out in the greenhouse with new fungicides, before field trials are initiated. Certain aspects of the biology of the pathogens of *Hevea* will be studied in the greenhouse.

Bark rot control experiments will be carried out to establish the most economical fungicide for use in Bark rot control, and the best time for application of same to obtain optimum results. The problem of the effect of different fungicides on the yield of latex will also be studied in detail.

Experiments will be carried out to establish the most economical method of controlling *Fomes lignosus*. There is every possibility that *Fomes* can be controlled by biological means, on the basis of the results of experiments now being carried out. This subject will be pursued in the next few years.

The susceptibility of various root stocks to root disease control will be studied, as Clone Tjir.1 is not being planted on a large scale now, and clonal seeds of this material may not be available in the near future.

The Plant Pathology Section will also carry out laboratory studies and initial screening of new fungicides, stickers and spreaders. Work will also be carried out on spray distribution patterns and the biological effectiveness of different fungicides.

Experiments will be carried out in the field to assess the efficacy of different fungicides for the control of *Oidium*, *Phytophthora* and *Gloesporium* leaf diseases. A certain amount of work will be carried out in order to help estates improve their standards of dusting and spraying.

The cumulative effect of leaf diseases on the growth and yield of *Hevea* will be studied in detail during the next five years.

Meteorological data from different districts will be carefully maintained with a view to perfecting methods of forecasting the occurrence of leaf disease epidemics of *Hevea*.

Rubber Chemistry Section

The Rubber Chemistry Section while continuing previous laboratory investigations, will commence work on adopting the Plasticity Retention Index as a specification. Although this Index looks promising, various factors can influence it and therefore careful investigations are very necessary before it is adopted.

With the evolution of newer clones, the natural anti-oxidants in latex, and in scrap in such clones will be assessed.

Research work on latex vulcanising systems with a view to manufacturing SP Sole crepe as well as investigations to improve the quality of scrap crepe will be initiated.

With the return of two specialist officers of the Institute after trainining in Malaya on the production of newer types of natural rubbers, it will be possible to set down small scale experiments on the manufacture of M. G. rubber, crumbled rubber, oil extended carbon black masterbatches and comminuted rubber. It is also proposed to establish pilot plants in respect of one or more of the above processes to assist and educate natural rubber producers. This division will shortly be in a position to assist in the conversion of crepe and sheet producing factories to make the above new rubbers.

Technical Specifications for natural rubber have come to stay, and the Rubber Chemistry Division will keep itself up-to-date in regard to Technical specification tests. It may be noted that raw rubber such as M. G., comminuted or crumbled, automatically qualify as rubber conforming to certain technical specifications.

The Rubber Chemistry Section will also participate in round-robin and other tests when so required, as part of the programme of the International Rubber Research and Development Board to which the Rubber Research Institute of Ceylon is affiliated.

Soils Chemistry Section

This is one section of the Rubber Research Institute where, more than in any other, experiments are set down and data obtained over a large number of years. Soils experiments or more precisely fertilizer trials which have been statistically laid-out, will continue to provide useful information during the next five years. The Soils Survey will probably be concluded before 1970.

In regard to field experiments on manuring and cultivation practices, it is proposed to lay down on commercial estates at least one additional long-term experiment every year. It may be possible in these cases to explore the feasibility of using the newer statistical lay-outs (where standard designs are unsuitable) for the testing of larger numbers of treatment combinations.

It is also proposed to initiate experiments using radio-isotope techniques towards improving efficiency and the rational use of fertilizers.

The Graduate Assistant who is due to proceed overseas on training shortly, is expected to gain experience in the field-use of radio isotopes so that detailed experiments could then be set down. In the meantime some pilot experiments to obtain preliminary data will be initiated.

Advisory Section

The new advisory division consisting of 4 officers will help to relieve research officers in the other divisions of routine estate visits which up to the present have taken a considerable amount of their time. If the need arises the division will be expanded at the appropriate time. Research Officers will however continue to be consulted on special problems highly technical in nature.

Smallholdings Section

This division will continue its advisory service to the smallholders. More emphasis will be placed on proper manufacture in order to ensure an increase in the production of R.S.S.I. If funds permit an enhanced subsidy on monel-metal sieves, coagulating pans and smoke houses will be paid to smallholders. Special attention will also be paid in regard to the problem of correct tapping of improved and high yielding clones. For this purpose more tapping classes will be provided in the various divisions.

Research Programme of the Coconut Research Institute

RESEARCH PROGRAMME OF THE COCONUT RESEARCH INSTITUTE

COCONUT provides the third most important source of foreign exchange earnings for Ceylon. It also constitutes an important factor in the domestic economy of the country, because 50 per cent. (approximately) of the total production is consumed locally.

A scheme for research on coconuts was initiated in 1929 under Ordinance No. 29 of 1928. Originally called the Coconut Research Scheme, it was given a higher status in 1951 and re-named " The Coconut Research Institute ".

The headquarters and the main laboratories are situated at Bandirippuwa Estate, Lunuwila, with sub-stations at Ratmalagara Estate, Madampe and Madayaye Estate, Pothukulama. In 1954 an Isolated Seed Gaden was established at Ambakelle, Adippola, for the production of selected high grade planting material.

From very small beginnings the Institute has now grown considerably with six Research Divisions (viz. Chemistry, Botany, Soil Chemistry, Agrostology, Crop Protection and Biometry) in addition to the Administration, Planting and Advisory Divisions. The Institute actually is now well poised for making advances in the breeding, cultivation, management and utilization of the coconut crop for the benefit of the industry and the country at large.

Present Work and Future Programme

As it functions at the present time, the Coconut Research Institute is organised mainly for agricultural research. Limited facilities however exist for laboratory scale investigations on the chemistry and technology of coconut products. In other words, the Institute is not strictly engaged in applied research for industry, though it does to some extent assist in the solution of process and production problems encountered in the coconut industry.

. Chemistry

Work of the Chemistry Division embraces two fields of inquiry viz. Plant Chemistry and Coconut Technology. At present, studies are in progress on the fundamental aspects of the nutrition of the coconut palm (during its early phases of growth) on the basis of sand pot-culture experiments. In the latter field, investigations are being projected to improve the fermentation efficiency of coconut toddy and the quality of products derived therefrom.

The following items of research in the respective fields are being envisaged for the next five years :—

(*a*) *Plant Chemistry.*—Foliar diagnosis as a guide to the mineral nutrition of coconut (applied aspects).

(*b*) *Coconut Technology.*—(1) Wet-processing techniques for the recovery of coconut oil from the kernel (2) Studies to improve the keeping qualities of Ceylon Desiccated Coconut (3) The economic utilization (industrial/agricultural) and/or disposal of refuse coir fibre dust from fibre mills.

2. Botany

Plant breeding in relation to the coconut crop is long-term research of tremendous importance to the industry. It is a field of research in which Ceylon leads and the possibilities are immense. Unfortunately coconut is a slow-growing crop so that results of major experiments are generally obtained only after protracted periods of time.

At present, the work of the Division of Botany (originally designated Genetics) impinges on the production of early bearing and high-yielding strains of coconut palms. Much experimental work has also been done on crossing selected varieties and forms of coconut, and studying the first generation palms. Some experimental material has been exceptionally promising, in that they are early bearing and high yielding. Prepotency has been established in coconut palms and trials are in progress to isolate prepotents. An Isolated Seed Garden for mass production of seed has been established and already 125 acres of it have been planted.

The following items of research are being envisaged for the next five years :—

(*a*) Testing of new strains of coconut in different parts of the island.

(*b*) Identification of prepotents from palms within the Seed Garden.

(c) Working out methods for mass production of improved seed

3. Soil Chemistry

The Division of Soil Chemistry is one of the oldest Divisions of the Institute. The present scope of research however has been extended to cover Soil Surveys in addition to field experimental and laboratory investigations.

The first series of modern field experiments on the manuring and cultivation of coconuts were those started in 1935 and 1938 at Bandirippuwa and Ratmalagara estates respectively. Experiments on the manuring of palms under different conditions of new young plantations have also been laid down on a number of estates.

The current research programme of the Division may be epitomised as follows :—

(a) *Soil Surveys.*—A reconnaisance survey of the coconut soils in the Southern Province is in progress and the soils are being classified at a series level.

(b) *Field Experiments.*—

(1) Study of optimum proportions and quantities of nitrogen (N), phosphorus (P) and potassium (K) requirements of adult palms. (Two factorial experiments at Bandirippuwa Estate).

(2) Study of optimum N, P and K requirements of young palms from seedling stage. (Two factorial experiments. One at Pothukulama and the other at Ratmalagara).

(3) Study of frequency (annual *vs.* biennial) and forms (organics *vs.* cattle manuring *vs.* inorganics) of manuring. (One experiment at Marandawila Estate, Bingiriya).

(4) Study on the effects of deep ploughing on adult palms. (One experiment at Ratmalagara).

(5) Study on methods of fertilizer placement and effects of liming on an acid lateritic soil on adult palms. (One experiment at Walahapitiya Estate, Nattandiya).

(6) Study on effects of different forms of nitrogenous fertilizers (ammonium sulphate, urea, sodium-nitrate, ammonium nitrate) on adult palms. One experiment at Mawatte Estate, Dankotuwa).

(7) Study on effects of different forms of nitrogenous fertilizer (ammonium sulphate, urea, sodium nitrate) and phosphatic fertilizers (saphos phosphate, super phosphate) and frequency of manuring (annual, 3-monthly and 6-monthly) on young palms from seedling stage. (One Experiment).

(8) Study of effects of NPK, magnesium fertilizers and cattle manuring on bearing palms. (Four simple observation trials at Pannipitiya and Polgasowita).

(9) Nutritional studies on 'leaf scorch' problem at Gonapinuwela S.P. (One simple observation trial on soil applications of major and trace elements to both healthy and affected palms at Kirimetiya Estate).

(10) Nutritional studies on immature nutfall at Palugaswetiya Estate, Bingiriya. (One simple field trial on effect of trace elements).

(c) *Laboratory investigations.*—

(1) Analysis of soil samples from surveys.

(2) Study of chemical composition of coconut leaflets and nut water in relation to fertilizer treatment and response to manuring on different soils. Presently chemical analyses of leaf and nut water samples from the 3" NPK trial at Bandirippuwa, and leaf samples from the 4" NPK trial on young palms at Pothukulama are being done. This is a long-term project which will be extended to other fertilizer experiments on the different soil types.

(3) Study of the chemical composition of coconut leaflet samples with a view to finding out which of the essential elements are in short supply, and for laying down field trials. Presently, leaf samples from palms on the lateritic soils of Gampaha District, and coastal marine sands of Chilaw, and the Mudukatuwa red loam soils are being analysed. This is a long-term project which will be extended to other areas.

(4) Study of the chemical composition of leaf and root samples from 'leaf scorch' palms to ascertain whether the problem is associated with any nutrient deficiency or toxicity.

(5) Study of the chemical composition of 'nut-fall' palms, t ascertain whether their problem is of nutritional origin.

The following items of research are being envisaged for the nex five years :—

(a) *Soil Surveys.*—Reconnaissance survey of coconut soils to b extended to the Western, North-Western (Kurunegala Dis trict) and Eastern Provinces during the next 5 years.

(b) ***Field Experiments.***—

(1) To continue the current field experimental programme.

(2) Study of optimum N, P, K, Magnesium and Boron requirements of adult coconut palms in Colombo and Galle districts. (Four field experiments).

(3) Study of response to different levels of N, P and K on high yielding coconut soils of Marawila and Marandawila. (Two field experiments).

(4) Study of optimum N, P, K, Mg and trace element requirements of adult palms on poor sandy soils at Chilaw, Nattandiya and Batticaloa. (Three field experiments).

(c) *Laboratory investigations.*—

(1) Studies on the transformation of soil nitrogen in relation to soil pH and response to nitrogen manuring.

(2) Studies on the availability of soil phosphates.

(3) Radio isotopes project: Studies on (i) the density of coconut root development at different depths and (ii) the relative efficiencies of the different forms of phosphatic fertilizers.

4. Agrostology

The Division of Agrostology (originally designated Agronomy) was created in 1955 to study: (1) the development and management of pastures that might be grown on coconut estates and used to provide meat and milk, without detriment to the coconut palm and (2) the wider problem of maintaining and improving soil fertility in areas where the one crop has been and perhaps will be grown for hundreds of years. The work of the Division also covers all studies relevant to the inter-relationship between livestock and coconut.

The current research programme of the Division may be summarised as follows :—

(1) Evaluation of the nutrient status of coconut soils by use of indicator plants in pots.

(2) Study on the competition between coconuts and pastures, with ancillary studies on the selection and management of mixed pastures with particular reference to light, micro-climate and soil nitrogen.

(3) Assessment of the potentialities of Sinhala cattle with a view to their improvement by selection, management and breeding.

The following items of research are being envisaged for the next five years :—

(1) Continuation of the current research programme with modifications as and when required.

(2) Extended studies on the competition between coconut and other crops with requisite ancillary investigations.

(3) Assessment of the economics of dairy production and intercropping with coconuts.

5. Crop Protection

Pests and diseases associated with the coconut crop in Ceylon were considered to be sufficiently serious to warrant the establishment of the Crop Protection Division in 1955. The current research programme of this Division is as follows :—

(*a*) ***Pests.—***

(1) The study and control of the Red Weevil pest—*Rhyncophoru* *ferrugineus*. (Ecology and chemical control).

(2) The study and control of the Coconut Caterpillar pest—*Nephantis serinopa*. (Follow up of biological control).

(3) The study and control of the Coconut Scale pest—*Aspidiotu* *destructor*. (Study of natural enemies prior to a biological control project).

(*b*) ***Diseases.—***

(1) 'Leaf Scorch' decline (mycological investigations, collection of field data from observation plots and soil fungicidal trials).

(2) Bud-rot and its control—*Phytophthora spp.* (Fungicidal trials).

(3) Leaf-blights and their control—*Pestalotsiopsis palmarum* and *Helminthosporium incurvatum*. (Isolation and identification. A control trial with fungicides and fertilizers).

(4) Stem bleeding and its control—*Ceretosistis paradoxa* (Isolation and identification, pathogenicity tests, fungicidal trials).

The following items of research are being envisaged for the next five years :—

(*a*) ***Pests.—***

(1) Red Weevil Control—(Present programme to be continued and extended to cover repellants and biological control).

(2) Coconut Caterpillar Control—Present programme to be continued and the biological control project extended to explore new parasites in other countries like Burma.

(3) Coconut Scale Pest—Present programme to be continued and extended. (Study of natural enemies. Import, breed and liberate *Cryptognatha nodicaps*).

(4) Stem bleeding and its control—*Ceretosistis paradoxa.* cal control with recently developed insecticides).

(5) Study and control of minor pests—Nettle grub, Locusts, Rats. Bats, Bandicoots and Porcupines.

(b) ***Diseases.***—

(1) 'Leaf Scorch' decline—Present programme to be continued and extended. (Plant anatomy in relation to 'Leaf Scorch' including symptomology.

(2) Bud rot—Present programme to be continued. (Investigations in consultaion with Specialist in Mycology working on 'leaf scorch').

(3) Leaf-blights—Present programme to be continued and extended (Economic importance, etiology, pre-disposing factors, host relationship, prevention and control).

(4) Stem-bleeding—Present programme to be continued and extended. (Economic importance, etiology, host relationship, prevention and control).

(5) Weed Control—Trials with weedicides and cultural methods for the economic control of weeds.

Biometry

The Division of Biometry was established in 1956 to assist other re- earch divisions in the design of experiments, and in the statistical nalyses and interpretations of results derived therefrom. The biome- rician was also entrusted with the maintenance of all agri-meteorolo- ical work.

The current research programme of this Division is as follows:—

(1) Evolving ways and means of reducing error in experiments both by adaptation of available designs as well as evolving various methods of calibration.

Studying the statistical distribution of variables normally used in the quantification of information relating to coconut research.

The research programme of the Division during the next five years will continue to be the same.

Staff Requirements

Apart from specialists and consultants who may be required, it is proposed to recruit the following staff during the next five years :—

(1) *Two Research Assistants* (One each for the Divisions of Soil Chemistry and Crop Protection).

(2) *Five Technical Assistants* (For the Crop Protection Division).

(3) *One Lab. and Field Assistant* (For the Biometry Division).

Increased Paddy Production

INCREASED PADDY PRODUCTION

Cultivated Paddy Lands

In 1964, the total extent of asweddumised land in Ceylon was 1,249,160 acres. Out of this extent, 1,013,611 acres were cultivated during Maha 1963/64 and 571,587 acres in Yala 1964, providing a total of 1,585,198 acres under paddy cultivation.

Out of the total extent of 1,249,160 acres of asweddumised land, 512,799 acres are described as being completely "rain fed", while 370,413 acres receive water from minor irrigation schemes and 365,950 acres receive water from major irrigation schemes.

The following table illustrates the character of the holdings of asweddumised paddy lands.

	No. of Holdings	Percentage to total No. of holdings	Extent covered	Percentage to total extent
Less than ½ acre	242,690	31·4	58,005	6·4
½ acre to less than 1 acre	253,823	32·9	147,376	16·4
1 acre to less than 2 acres	162,120	21·0	193,794	21·5
2 acres to less than 5 acres	85,310	11·1	231,726	25·7
5 acres to less than 10 acres	19,705	2·6	122,073	13·6
Over 10 acres	8,260	1·1	146,996	16·3

Source : 1946 Census Report Vol. I Part II, Table 70 ;
Survey of Landlessness SP XIII of 1952, Tables IV and V.

It will be seen that in 1946 31.4 per cent. of all holdings were less than ½ acre 63.3 per cent. less than 1 acre, while nearly 85 per cent. were less than 2 acres.

It is therefore evident that under existing conditions of ownership of paddy lands, investments for increasing production must be channeled primarily towards the small-holder.

Present and Future Rice Requirements

The population of Ceylon in 1964 was estimated to be 10,971, The total consumption of rice in Ceylon in 1964 was provisiona estimated by the Central Bank at 1,138,944 tons. Assuming that population increases by 2.5 per cent. in 1965 and that per cap consumption remains unchanged, the quantity of rice required feed the additional increase in population would be about 28,000 to On this basis the total annual consumption of rice in 1965 would approximately 1,167,182 tons. This would be equivalent to about 8 million bushels of paddy. In order to arrive at the total quantity paddy needed for self-sufficiency in 1965, it would be necessary add to this figure 3.5 million bushels of paddy on account of se requirements. This would amount to 85.1 million bushels of paddy

The total extent of asweddumised land for paddy cultivation 1964 has been estimated at 1,249,160 acres. The actual total exte sown in Maha 1963/64 and Yala 1964 was 1,505,198 acres. Assumi that 85 per cent. of the sown extent is harvested, the estimate present requirement of 85 million bushels of paddy could produced on the harvested acreage with an average yield per ac of 65 bushels.

The annual additional increase in population has been estimate at about 274,000 persons. The consumption requirements of th additional annual increase in population can be met on the presen harvested acreage by an increase in the average yield of about 1 bushels per acre per annum. During the past 10 years however th increase in the average national acre yield has been only about 0 bushels.

The position of local production of rice as against quantities of ric imported is seen in the following table :

Year	*Domestic Production (Tons)*	*Imports (Tons)*
1957	437,000	556,332
1958	511,000	579,590
1959	508,000	518,530
1960	600,000	532,173
1961	603,000	496,560
1962	672,000	514,975
1963	687,000	550,702
1964	705,200	647,616

Source : Department of Census and Statistics and Customs Retu

The jump in imports between 1963 to 1964 may well have been due to the unsettled conditions which prevailed in the Port of Colombo. This hindered the flow of imports in the last two months f 1963 and these imports were reflected in the figures for 1964.

The increase in local production has come partly by an increase n the acreage under cultivation and partly by an increase in the yield per acre. The acreage sown under paddy increased from 1.382 million acres in 1958 to 1.585 million acres in 1964. The distribution f this increased acreage of the sown extent in terms of irrigation acilities is as follows :—

Year		*Major Irrigation Schemes*	*Minor Irrigation Schemes*	*Rainfed*	*Total*
958	.. ..	378,710 ..	383,747 ..	619,727 ..	1,382,184
964	.. ..	516,361 ..	424,464 ..	644,373 ..	1,585,198
	Increase ..	137,651	40,717	24,646	203,014

The yield per acre increased over the same period from 34.1 to 8.6 bushels per acre in Maha and from 34.9 to 38.9 bushels per acre n Yala.

Many of the institutions and services required for assisting rice ultivators have been established.

Rice research and extension are organised in the Department of griculture. Rice research is undertaken through a network of esearch and experiment stations located in the different agro-limatic regions of the country. Rice extension is at present organised n an island-wide basis under the immediate direction of a senior gricultural Extension Officer stationed in the Districts. This senior xtension Officer works through a large number of qualified Agricultural Instructors and Overseers who take the Extension Services own to the village level.

The Department of Agriculture also sustains a scheme for the roduction of 'certified' seed paddy so as to ensure that rice cultiva-ors get a regular supply of tested and certified seed of high quality rom the improved varieties.

Liberal credit facilities, subsidised fertilizer, an attractive uaranteed price and a government run marketing scheme for the urchase of paddy are available to the rice cultivator. Security of enure has been assured through a land reform bill known as the

Paddy Lands Act. These services are organised and administered the Department of Agrarian Services. In addition, this Departm also operates a Crop Insurance Scheme in several districts of country.

The import and wholesale distribution of fertilizer for rice handled by the Ceylon Fertilizer Corporation which was set up this purpose. The distribution of fertilizer at village level is d by the Department of Agrarian Services in collaboration with Multi-purpose Co-operative Societies and their Unions.

The rice cultivators themselves are organised in legally constitut Cultivation Committees, which are supported at village level Multi-purpose Co-operative Societies through which credit, fertilize agro-chemicals and other supplies are channelled to the cultivato The Multi-purpose Co-operative Societies are also the local purchasi agents of paddy for the Government run Marketing Scheme.

Programme of Investment

What is the nature and scope of the investment that should made for increasing production of rice on lands which are at prese cultivated ? The fields in which substantial investments must be ma for increasing paddy production within a reasonably short period time are—

(*a*) fertilizers,
(*b*) fertilizer stores,
(*c*) seed paddy,
(*d*) seed paddy stores,
(*e*) tractors and other machinery for paddy cultivation as w as their spare parts,
(*f*) agro-chemicals and application equipment,
(*g*) vehicles for the extension services.

Since these fields of investment involve considerable forei exchange as well as local expenditure it is necessary to set out brie the reasons for proposing to invest in these fields and the way which they can contribute towards increasing paddy production.

Any programme for increasing rice production on lands wh are cultivated at present involves the control and harmonisation a variety of complex human technical and organisational factors. T proper co-ordination of such a variety of factors cannot obviously achieved in a few years. But different stages of development thr up different sets of problems, and at least some of them call urgent solutions if production is to reach yet another stage advance.

In the present stage of rice production, the provision of agricultural supplies such as fertilizer, agro-chemicals and tractors, has become a matter of grave urgency. The cultivators have long since recognised their value and are clamouring for them in increasing amounts. But the demand has been satisfied only to a very small extent. Agricultural research and agricultural extension cannot be expected to assist in improving production much further until the obstacle of supplies is removed. The cultivators themselves have indicated in no uncertain terms their immediate needs in the matter of agricultural supplies. The entire range of price and credit incentives which have created the environment for adoption of scientific methods of cultivation will be nullified if the essential requirements for scientific farming are in fact being denied to the cultivators.

The present position as regards fertilizers, agro-chemicals. machinery and stores for paddy cultivation and the proposals for increasing the expenditure on these items are explained below.

Fertilizers

It is now generally accepted that farmers are alive to the role of artificial fertilizer in increasing yields. In the case of paddy, the greater and balanced application of fertilizer has been rendered possible largely by introduction of improved varieties responsive to high fertilizer use, as well as by a richer understanding of the characteristics of the rice-soils of the Island.

As will be seen from the following table the amounts of fertilizer used in paddy cultivation has shown a marked increase over the last several years :—

1959-60	20,173 tons
1960-61	29,041 tons
1961-62	38,075 tons
1962-63	47,058 tons
1963-64	60,138 tons

The Department of Agriculture has periodically made recommendations, which are given due publicity, as to the kinds and quantities of fertilizer that should be applied to paddy. As a result of extensive investigations and field-trials conducted by the department during the last few years and also as a result of the data gathered from the Rice-soils Fertility Survey, it has been possible for the Department of Agriculture, in its most recent recommendations, to give for the first time, a detailed scheme of fertilizer application for each D. R. O's division in the Island.

In this connection, it is worth recording (particularly in vie of lay opinion that increased fertilizer inputs are not leading t increased yields in paddy) that the trials in cultivator's fields laid ou by the Soil Fertility Project, jointly sponsored by the Government o Ceylon and the F. A. O. and currently in operation, is beginning t show interesting results. These trials which embraced severa districts in the dry-zone were designed to test out in cultivator fields themselves the magnitude of the response of improved departmental varieties to the application of fertilizer according to departmental recommendations. This field project which has been planned and directed largely by an Agronomist of the F. A. O. has shown that in the best paddy growing districts of the dry-zone the use of improved departmental varieties in conjunction with fertilizer practices as recommended by the Department and supported by correct standards of management can give average yields of over 75 bushels per acre.

In view of these considerations, one must naturally expect that the ready availability of fertilizers to the cultivator at the correct times will be a main gateway to increases in paddy production.

Mention must also be made of the subsidy scheme operated by the Department of Agrarian Services which has proved a great inducement in popularising the use of fertilizer. This scheme provides for two types of subsidies :—

A 50% subsidy on cash purchases by societies, cultivation committees and individuals
and
A 33⅓% subsidy on credit purchases by societies.

In 1963-64 the amount of fertilizers sold on the 50 per cent. subsidy was 66 per cent. of the total quantity of fertilizer that was sold. The readiness of the farmers to use fertilizer, the improved fertilizer recommendations which are being applied in the field in conjunction with improved varieties and the operation of the fertilizer subsidy scheme have provided excellent conditions for making a big push in the application of fertilizer to paddy in the next few years. Even though the quantities of fertilizer used for paddy cultivation have greatly increased (60,000 tons in 1963-64), the current consumption in relation to the total cultivated area is no where near the limits that should be attained. Theoretically, the application of the full quantity of fertilizer as recommended by the Department of Agriculture throughout the total cultivated area of 1.5 million acres will lead to an annual fertilizer consumption of nearly 240,000 tons made up of 30,000 tons of urea, 90,000 tons of ammonium sulphate, 45,000 tons of muriate of potash and 75,000 tons of rock phosphate. The amount of 60,000 tons of fertilizer used for paddy cultivation in 1963-64 constituted only 25 per cent of the hypothetical optimum of 240,000 tons n fact, however, the total cultivated acreage of 1.5 million does not nd itself immediately to cultivation in improved varieties with a igh response to fertilizer because physical limitations such as lack f water, water logging and salinity prevent a high level of fertilizer pplication in parts of the cultivated acreage. Allowing for this limi- ation, it should be possible to work towards attaining a target of 50,000 tons of fertilizer for paddy in the coming years.

It is, therefore, proposed to present a phased five-year pro- ramme for increasing fertilizer consumption for paddy from the 0,000 tons in 1964-65 to 150,000 tons in 1969-70. In planning for this dditional fertilizer consumption over the five-year period, certain nvestments are required not only in respect of the additional quan- ty of fertilizer but also in respect of expanded and improved storage nd distribution facilities which are indispensable if the imported rtilizer is to be made available to farmers in the correct quantities nd at the correct times.

The storage facilities now available to the Department of grarian Services seem to be totally inadequate for meeting a pro- ramme of expanded fertilizer distribution. The present position re- arding permanent fertilizer stores of the Department of Agrarian ervices is as follows :—

District	*Completed*	*Under Construction*
Colombo	—	—
Kalutara	350	500
Kandy	550	200
Matale	200	600
Nuwara Eliya	—	—
Galle	350	650
Matara	200	1,000
Hambantota	400	200
Jaffna	550	—
Mannar	200	350
Vavuniya	—	650
Batticaloa	350	450
Amparai	200	400
Trincomalee	—	—
Kurunegala	400	600
Puttalam/Chilaw	200	—
Anuradhapura	550	450
Polonnaruwa	750	—
Badulla	—	1,200
Moneragala	350	—
Ratnapura	—	200
Kegalle	350	200
Total	5,950	7,650

If fertilizer consumption for paddy is to be increased f 60,000 tons to 150,000 tons within a period of five years, it is ne sary to plan for the construction of stores of sufficient size to s the paddy growing areas which have the best potential for increa yields. The experience of the Department of Agrarian Services shown that the maintenance and operation of small stores is unec mic. The construction of fertilizer stores of adequate capacity match the potential demands in a given area must be treated as indispensable requirement for expanding fertilizer consumption paddy production.

The programme for the construction of stores to suit the p posed expansion of fertilizer consumption of 90,000 tons in the n five years is therefore presented in schedule I.

The data furnished in schedule I requires several elucidatio The districts have been arranged in order of estimated potential f increased fertilizer consumption on existing cultivated lands. Colu 3 of the schedule is self-explanatory. The figures in Column 5 m be treated as strictly approximate as they are not based on any stati tical surveys but on estimates made by the District Agricultural E tension Officers. Column 6 and the table on page 81 indicate h inadequate the existing storage facilities are in permanent Gover ment buildings for an expanded fertilizer distribution programm The additional storage capacities proposed in Column 7 have soug to link the expansion in storage with prospects for expansion in fe tilizer consumption. Furthermore, these additional storage capaciti are in sufficiently large units to ensure adequate supplies in the d tricts. The figures in Column 9 are approximate and are based information given in Columns 3, 5 and 8 and on the knowledge the districts available through the Agricultural Extension Servi The estimated figures in Column 9 do however pre-suppose a smoo ly functioning organisation for grant of credit and distribution fertilizer. Column 10 is an entirely hypothetical estimate of ma mum fertilizer consumption on the assumption that the current fe tilizer recommendations of the Department of Agriculture are u over the whole of the extent sown in paddy.

Cost of additional fertilizer and stores. The imports of fertili were under open general licence till the end of 1963. From Dece ber, 1963, imports were subject to exchange control. The fore exchange allocation for import of fertilizer for tea, rubber, coco paddy and other crops for 1965 has been fixed at Rs. 90 million. T estimated fertilizer consumption for paddy during 1963 had be placed at 60,000 tons while actual consumption in 1963-64 was 60, tons. Restrictions in foreign exchange apparently required that quantity of fertilizer to be imported for paddy in 1963 should remain the same as in 1963-64 even though there was evidence of a higher demand.

If the programme now proposed for increasing fertilizer consumption for paddy to 150,000 tons in 1969-70 is to be put into operation it would be necessary to work on the basis that the increased consumption would be about 10,000 tons in 1965-66, 15,000 tons in 1966-67, 20,000 tons in 1967-68, 20,000 tons in 1968-69 and 25,000 tons in 1969-70.

As such, foreign exchange should be released for importing a total quantity of 70,000 tons in 1965-66, 85,000 tons in 1966-67, 105,000 tons in 1967-68, 125,000 tons in 1968-69 and 150,000 tons in 1969-70.

The expansion of the fertilizer programme will depend on the programme of stores construction. Assuming that the construction of stores accommodation for 1,000 tons of fertilizer will cost Rs. 100,000 the total cost of providing 38,500 tons of additional storage capacity envisaged in Column 4 of schedule I will cost approximately Rs. 4 million. This expenditure will however be spread out over a five year period. The stores construction programme need not also be undertaken simultaneously in all districts. Work can commence in those areas with high potential for increased yields. It should also be possible to construct stores in such a way that units of say 1,000 tons storage capacity are constructed simultaneously in certain selected districts and made available for stocking fertilizer while additional units of the same size are being constructed.

The Department of Agrarian Services which is now responsible for the construction of fertilizer stores cannot obviously undertake a speedy and expanded programme *of stores* construction. It has neither the technical staff nor the procedural flexibilities for undertaking such a task. Since a separate Fertilizer Corporation has been established for the purpose of importing and selling fertilizer, it is proposed to entrust this Corporation with the responsibility for constructing the additional stores required for the proposed programme. The Corporation will also consider the desirability of undertaking fertilizer distribution work at district level, if such a step is considered necessary. The Multi-purpose Co-operative Societies will be encouraged to undertake the stocking and retail sales of fertilizer at village level. The ideal situation which we must seek to attain is where cultivators will be able to buy the required fertilizer for cash or credit within a few days of applying for it and without having to go through the elaborate procedures that now prevail.

In this connection reference must be made to a proposal which has already received the approval of Government for pushing fertilizer availability to the village level. The scheme permits the following :—

(*a*) The grant of a 50% subsidy to Co-operative Societies and Cultivation Committees which obtain their fertilizer on payment of the balance 50% of the value of the fertilizer, and to allow them to draw such fertilizer from the Agrarian Services Department in advance, irrespective of whether individual members have applied to the society or committee for the same quantity of fertilizer or not ;

(*b*) To allow societies which will avail themselves of this concession to sell the fertilizer so obtained either on payment of the balance 50% of the value of the fertilizer, or on credit, and to authorise them to recover interest at a rate not exceeding 10% from members who take such fertilizer on credit, after amending their by-laws where necessary.

Seed Paddy

The Department of Agriculture is responsible for the production of the *Foundation Seed* which is multiplied in departmental farms under controlled conditions. The seed thus multiplied entirely under the supervision of the Department is referred to as *Registered Seed.* This seed is then issued to private seed farmers who in turn multiply the seed for sale to Government as *Certified Seed* at the fixed price of Rs. 14/- a bushel. This seed is then distributed to the farmers. The Department of Agriculture has financial provision each year for maintaining an organisation for testing the Foundation, Registered and Certified Seed produced each season for purity, germination and quality. Only seed that is up to the required standards is passed at each of the above stages and finally as Certified Seed to the cultivators. The Registered Seed issued to private seed farmers is renewed each season while the Certified Seed issued to cultivators is renewed every four or five years.

At present about 80,000 bushels of 'certified' seed paddy produced on private seed farms are issued to cultivators. The expanded paddy production programme will require 120,000 bushels of Certified Seed in 1965/66, 150,000 bushels in 1966/67 and 200,000 bushels in 1967/68, 1968/69 and 1969/70. There will be no difficulty in providing this quantity of Certified Seed. The cost of the subsidy and the costs of operating the seed paddy scheme will however have to be increased. These costs have been placed at Rs. 2.7 million during the five year period 1965/66 to 1969/70.

The present arrangement is to store certified seed paddy for issue to cultivators in the same stores as for the Guaranteed Price Scheme. This arrangement which had apparently been resorted to as an economy measure has proved extremely unsatisfactory. The reasons principally are that in a G.P.S. Store it is difficult to take effective measures against grain storage pests by fumigation and other means. There is a consequent loss in the quantity and quality of seed paddy. The storage of seed paddy also requires special protection from excessive humidity. This is not always obtainable in G.P.S. Stores. Exposure to humid conditions results in a reduction in germination. Seed paddy with low germination or which has been subject to pest attacks is not really high quality seed and the issue of such seed tc farmers is ultimately detrimental to the objective of increasing yields. High quality seed of improved varieties is in fact the foundation on which fertilizer and management practices are built to assure high yields. It is therefore of the utmost importance that certified seed should receive the benefits of special storage conditions which cannot easily be obtained in conditions prevailing in G.P.S. Stores. Sometime back a decision had been taken to have separate stores for certified seed and in fact two such stores had been constructed at Kundasale and Batalagoda. Subsequently, with the decision to have certified seed in G.P.S. Stores themselves, these two stores had been handed over to the G.P.S.

Admittedly the construction of separate seed stores to be maintained by the Department of Agriculture will involve a heavy capital expenditure on stores construction and a recurrent expenditure for a small increase in the cadre. But a beginning should be made and it is proposed that special seed stores be constructed in the following principal seed producing areas :—

Polonnaruwa
Kurunegala
Anuradhapura
Mannar
Amparai
Hambantota
Kandy
Jaffna
Batticaloa
Ratnapura

It is proposed to construct two stores of 5,000 bushel capacity each n the districts listed above. The estimated cost of construction of each tore is Rs. 30,000.

Agro-chemicals

There has been a marked increase in the use of agro-chemicals on paddy and other crops during the past few years. The C.I.F., value of agro-chemicals used on paddy and other crops (excluding tea, rubber and coconut) in 1962 has been estimated at Rs. 874,000/- and the figure has increased to Rs. 1.1 million in 1964. Unlike in the case of export crops like tea and rubber, it is difficult to make an accurate assessment of the actual amounts of pesticides that are used and will be required in the next few years for paddy and other crops. However, while it can be considered that most of the tea and rubber plantations are consuming pesticides much nearer their full potential, the use of pesticides on paddy and other crops is extremely small although the potential for such uses quite large. In fact, it is doubtful whether even 5 per cent. of the total pest damage on paddy is controlled today. Weedicides have not been used extensively in paddy areas in previous years but the use of weedicides will expand in the coming years.

In this connection special mention must be made of the increasingly important role of weedicides. The increasing extents of unweeded paddy fields even in the traditionally best paddy growing areas of the Island should be a matter of general concern. Uncontrolled weed growth can depress paddy yields by as much as 25 to 50%. The emphasis on fertilizer use unaccompanied by elementary management practices such as weed control can lead to a situation where large paddy tracts are being fertilized for weeds. Weed control by manual means is proving increasingly difficult in most areas and in particular the dry-zone areas where there is a serious shortage of labour for manual operations on paddy lands. Efforts are being made to organise on a regular footing mass weeding campaigns through the deployment of school children. But the problem can be properly solved only by the wide application of weedicides. It so happens that in this field some really striking advances have been made. Until recently there has been no weedicides capable of destroying grasses in a growing crop of paddy without damaging the paddy itself. The new weed-killer 3-4 DPA has overcome this difficulty in striking fashion. The use of this compound can now ensure effective weed control without any risk of damage to the paddy crop.

In view of the above considerations high priority should be given to importing agro-chemicals for paddy in much larger volume than has been made available in recent years. It is proposed that a sum of Rs. 17 million in foreign exchange be made available for the import of agro-chemicals for the period 1966-1970. It is expected that about Rs. 3 million worth of agro-chemicals would be used in 1965/66

Application Equipment

There has been a shortage of dusters, sprayers and other application equipment. If the volume of agro-chemicals to be imported for paddy is being expanded there should be a generous supply of application equipment. It is therefore proposed that Rs. 3 million worth of foreign exchange be made available for importing application equipment and spare parts during the 3 year period 1966-1968.

Agricultural Machinery

There is general agreement that there is an increasing and largely unsatisfied demand for agricultural tractors, implements and spares. In the principal paddy growing areas in the dry-zone there is a shortage of labour during peak periods of the cultivation seasons. In addition to the shortage of labour there is also a scarcity of buffaloes. These limitations have continued even though the acreage under paddy has been expanding. But such expansion has generally been accompanied by marginal and even inefficient standards of cultivation. The shortage of tractors and ancillary equipment has had two serious consequences for paddy cultivation. One is that standards of preparatory tillage have tended to deteriorate because the cost of hiring tractors being so high a superficial rather than an intensive application of the machine to the soil is preferred. The other is that the non-availability of tractors to meet everyone's requirements at the proper time has compelled cultivations which are too late in the season and cannot therefore produce yields which might otherwise have been obtained.

At present there are about 6,000 agricultural tractors (4 wheel ype) and about 1,500 garden tractors (2 wheel type) in Ceylon. As ompared with this strength of private owned tractors, the Departnent of Agriculture maintains 379 tractors for hiring to cultivators nd of these 149 tractors are over 10 years old. The tractor hiring ervice of the Department of Agriculture is being run since 1958 on n Advance Account and the nett accumulated loss on account of this ctivity from the financial year 1958/59 to the end of the financial ear 1961-62 is Rs. 5,147,000 while the anticipated nett loss for the nancial year 1962-63 is about Rs. 1,900,000. It is therefore, apparent hat the tractor services provided by the Department of Agriculture re really a concealed subsidy to paddy cultivators. The hiring of ractors cannot be considered a legitimate function of the Department f Agriculture and plans for increasing the strength of the tractor eet in the Island must rest on the basis that the additional tractors ill be made available to private owners rather than to the epartment of Agriculture.

There is considerable difficulty in getting accurate statistics of the imports of tractors and implements used in farming operations and the spare parts required for them. The following figures have therefore to be treated as tentative.

In 1961 estimated value of imports of agricultural tractors was Rs. 7 million, agricultural implements Rs. 3 million and spare parts Rs. 2 million. These figures have been based on import control declarations made by local dealers, making allowance for the fact that industrial tractors and constructional tractors have been included with the agricultural tractors.

The estimated imports in 1963-64 and in the first half of 1965 are as follows :—

		Tractors		*Implements*		*Spares*
1963	..	Rs. 6 million	..	Rs. 2 million	..	Rs. 2 million
1964	..	„ 1 „	..	„ 2 „	..	„ ¾ „
1965 (½)	..	„ ¾ „	..	„ ¾ „	..	„ ½ „

About 900 agricultural tractors appear to have been imported in 1961, about 700 in 1963 and about 100 in 1964.

There also appears to be a considerable backlog which has to be made good in the import of tractors to satisfy current demand. It is recommended that 5,000 (4 wheel) tractors, associated implements and spares be imported during the period 1966 to 1970. These imports can be phased as follows :—

1,500 (1966) 1,500 (1967) 1,000 (1968)
500 (1969) and 500 (1970)

The C. I. F. cost of a four wheel tractor is about Rs. 8,000. With the implements and spares the cost is about Rs. 12,000. On this basis the cost of importing 5,000 tractors with implements and spares over the five year period will amount to Rs. 60 million. This will be spread out at Rs. 18 million in the first year, Rs. 18 million in the second, Rs. 12 million in the 3rd, and Rs. 6 million in the 4th and 5th years.

It is also recommended that exchange be similarly released for importing 500 (two wheel) tractors annually with associated implements and spares. The total foreign exchange cost of this would be about Rs. 8.7 million and spread out at approximately Rs. 1.7 million in each year.

In addition to these imports it will be necessary to release adequate exchange for importing spares for the existing fleet of four wheel and two wheel tractors.

Vehicles

In view of the restrictions regarding the import of vehicles during the past years the number of serviceable vehicles available for the extension service of the Department of Agriculture has declined considerably. The lack of reliable vehicles for circuit work in the rural areas has been a recurrent complaint of senior extension workers. It is therefore proposed that a minimum of 20 Jeeps be imported for the extension service during 1966 and 1967. Placing the value of a Jeep Rs. 10,000, the import of 20 Jeeps will involve a foreign exchange expenditure of Rs. 0.2 million. This can be spread out at Rs. 0.1 million in 1966 and Rs. 0.1 million in 1967.

Crop Cutting Surveys

The present system of estimating paddy yields is unsatisfactory in several ways and there is an urgent need for undertaking a thorough-going survey for estimating yields in paddy. Such a survey may well reveal that average yields are in fact higher than those currently accepted. At present the responsibility for organising and conducting the two seasonal surveys for determining yields in paddy is vested with the Department of Census and Statistics. This Department conducts surveys in Maha and Yala on the basis of crop-cuttings from about a 1,000 plots which are distributed among different districts. The location of these plots is according to certain statistical methods which have been worked out by the Department. The field-staff of the Departments of Census, Agriculture, Agrarian Services and officers drawn at random from other Departments are deployed for this work.

The major criticism against the surveys as conducted at present has been that there is very inadequate supervision over 'crop-cutting' in the field. This seems unavoidable under existing arrangements where officers called upon to do this work are inadequately paid and generally treat this as a nuisance cast upon them in addition to their normal work. Since yield estimates emerging from these surveys form the very base of all planning in this field, it would indeed be a foolish policy to stint on the comparatively small expenditure that would be required for conducting proper yield surveys. These surveys should be of two types. One is the regular bi-annual surveys which are now conducted by the Department of Census. In addition, there should be at intervals of between 3 to 5 years a more comprehensive survey designed to gather information of yield increases as related to other factors such as irrigation, fertilizer use, improved varieties and standards of management.

It is therefore proposed that commencing from the financial year 1965-66, a sum of Rs. 50,000 should be allocated each year for conducting the regular bi-annual surveys of yields in paddy. Similarly a sum of Rs. 100,000 should be provided for each special survey whenever it is undertaken. It is proposed to organise the first of such special surveys in 1965-66.

Summary of Proposals

(*a*) Foreign exchange should be released for importing a total quantity of 70,000 tons of fertilizer for paddy and other crops in 1965-66, 85,000 tons in 1966-67 and 105,000 tons in 1967-68, 125,000 tons in 1968-69 and 150,000tons in 1969-70. The amount of foreign exchange required for this purpose will be Rs. 20 million in 1965-66, 24.5 million in 1966-67, 30 million in 1967-68, 36.5 million in 1968-69 and 43.5 million in 1969-70.

(*b*) Budgetary provision should be made for the cost of the subsidy on this fertilizer amounting to Rs. 14 million in 1965-66, 17 million in 1966-67, 21 million in 1967-68, 25 million in 1968-69 and 39 million in 1969-70. The cost of the subsidy in 1964-65 was Rs. 12 million.

(*c*) Budgetary provision should be made available in a sum of Rs. 1.5 million for 1965-66, 2.5 million in 1966-67 and 1.5 million in 1967-68 for the construction of fertilizer stores as proposed in column 7 of Schedule I annexed to this memorandum. In 1964-65 a sum of Rs. 0.5 million has been provided under the votes of the Commissioner of Agrarian Services for the construction of fertilizer stores. The financial provision that is now asked for should be made available to the Fertilizer Corporation which will undertake stores construction work.

(*d*) Budgetary provision in a sum of Rs. 0.2 million should be made available in 1965-66, 0.2 million in 1966-67 and 0.2 million in 1967-68 in the votes of the Department of Agriculture for the construction of seed paddy stores. No financial provision exists for this work in 1964-65.

(*e*) Budgetary provision in a sum of Rs. 0.4 million should be provided in 1965-66, 0.5 million in 1966-67, 0.6 million in 1967-68, 1968-69 and 1969-70 under the votes of the Department of Agriculture for the cost of the subsidy and operation of the Seed Paddy Scheme. The provision during 1964-65 is Rs. 0.3 million.

(*f*) Foreign exchange provision should be made in a sum of Rs. 2 million in 1965-66, 3 million in 1966-67, 4 million in 1967-68, 1968-69 and 1969-70 for the importation of agro-chemicals required for paddy and other crops (excluding tea, rubber and coconut). The financial provision in 1964-65 has been Rs. 1 million.

(*g*) Foreign exchange in a sum of Rs. 0.6 million in 1965-66, 0.7 million in 1966-67, 0.6 million in 1967-68, 0.7 million in 1968-69 and 1969-70 should be released for importing spraying and dusting equipment and spare parts used in the application of agro-chemicals. No reliable figures are available of the value of these imports during 1964-65.

(*h*) Foreign exchange in a sum of Rs. 19.7 million should be released in 1965-66, 19.7 million in 1966-67, 13.7 million in 1967-68, 7.7 million in 1968-69 and 7.7 million in 1969-70 for the import of tractors, implements and spares necessary for an intensified programme of paddy cultivation. During 1964-65 a sum of Rs. 4 million approximately has been allocated for this purpose.

(*i*) Budgetary provision in a sum of Rs. 100,000 should be provided in 1965-66, 50,000 in 1966-67, 50,000 in 1967-68, 50,000 in 1968-69 and 100,000 in 1969-70 to meet cost of surveys for estimating paddy yields.

Proposed Investment and Anticipated Returns

The total amount of the investment proposed for the increased paddy production programme, the break-up of this expenditure on different items and the phasing for a five year period 1965-66 to 1969-70 are shown in Schedule 2.

The total investment on the paddy production programme over the five-year period is Rs. 359.35 million. Of this amount Rs. 243.20 million constitutes the foreign aid exchange component while Rs. 116.15 million constitutes the rupee expenditure.

The investment covers the following fields :—

1.	Fertilizers	Rs. 154·4 million
2.	Agro-chemicals	„ 17 „
3.	Drying and Dusting Equipment	„ 3 „
4.	Tractors, Implements and Spares	„ 68·5 „
5.	Vehicles	„ 0·2 „
6.	Subsidy on Fertilizers	„ 107·0 „
7.	Fertilizer Stores	„ 5·5 „
8.	Seed Paddy Stores	„ 0·6 „
9.	Seed Paddy Scheme	„ 2·7 „
10.	Crop cutting survey	„ 0·35 „

There is no single yardstick by which the returns on an investment of this magnitude can be assessed, particularly in relation to a crop such as paddy which is primarily a crop of the small-holder. Besides, a part of the investment on items, such as, Fertilizer Stores, Seed Paddy Stores, Agricultural Machinery and Vehicles can provide benefits for periods well beyond the five-year period of this current phase. It is also generally agreed that in matters of agricultural production, the building up of certain facilities and an organisation for handling those facilities can lead to cumulative growth effects. It must also be considered that the programmes of the department of Irrigation in implementation will expand the area under cultivation in rice. Further a programme to increase the asweddumised but uncultivated area by an extent of approximately 100,000 acres during the next three years must also be taken into account. Improvements to irrigation facilities will also be effected through the minor irrgation programme. Having these considerations in mind, the anticipated increase in production of paddy over the five-year period has been assessed on the basis that it is reasonable to estimate for a 40 per cent increase over the five-year period. This works out approximately to an increase of 20 million bushels of paddy or 290,000 tons of rice.

Essential Data for a Programme of Expanded Fertilizer Consumption and Stores Construction

District		Asweddumised Paddy Land 1963/64 (acres)	Extent of Paddy Lands Sown in Maha 1963/64 and Yala 1963 totals*				Average Yield per acre in Bushels		Improved Varieties, Percentage of Sown Extent	Fertilizers Storage Capacity		Fertilizer Consumption		
			Major Schemes (acres)	Minor Schemes (acres)	Rainfed (acres)	Total (acres)	Maha 1963/1964	Yala 1964		In Departmental Buildings available and under construction (tons)	Proposed Additional Storage (tons)	Current Consumption 1963/1964 (tons)	Estimated Consumption 1970 (tons)	Hypothetical Maximum Consumption (tons)
		(2)		(3)			(4)		(5)	(6)	(7)	(8)	(9)	(10)
Kurunegala	..	151,949	30,530	67,079	96,818	194,427	34·60	36·58	53·1	1,000	5,000	9,226	20,000	35,434
Amparai	..	104,727	87,789	5,787	32,119	125,695	36·97	38·10	81·8	600	5,000	9,765	15,000	21,210
Anuradhapura	..	126,115	53,827	85,621	1,432	140,880	40·40	39·91	52·1	1,000	4,000	2,613	14,000	24,654
Polonnaruwa	..	60,416	82,438	8,960	4,438	95,836	57·15	48·02	71·1	750	4,000	3,511	12,000	16,771
Kandy	..	46,522	8,700	34,288	33,427	76,415	51·45	44·83	73·5	750	3,000	4,925	9,000	12,900
Jaffna	..	80,650	33,116	2,204	50,022	85,342	28·30	36·79	32·4	550	2,000	4,065	9,000	13,534
Batticaloa	..	98,906	42,404	7,424	40,285	90,113	33·95	36·57	68·8	800	2,000	2,842	7,000	11,257
Colombo	..	65,395	4,578	4,943	67,523	77,044	33·35	34·12	73·2	—	—	2,807	7,000	11,280
Hambantota	..	44,320	39,972	7,777	5,935	53,684	38·30	44·08	75·4	600	2,000	2,092	6,000	7,826
Matara	..	49,404	15,192	13,692	52,618	81,502	37·35	35·47	47·5	1,200	1,000	1,661	6,000	11,202
Vavuniya	..	56,432	14,946	23,416	21,061	59,423	37·50	44·92	57·1	650	2,000	903	6,000	10,398
Kegalle	..	27,328	—	10,385	36,475	46,860	51·95	44·77	40·9	550	1,000	2,989	5,000	5,732
Trincomalee	..	48,480	35,426	5,684	15,187	56,297	33·90	42·82	68·4	—	—	1,037	5,000	9,850
Mannar	..	34,037	24,400	7,376	3,325	35,101	45·20	45·60	81·1	550	1,000	1,556	4,000	5,264
Puttalam	..	32,721	5,395	21,554	3,716	30,665	34·20	31·60	31·2	200	2,000	1,006	4,000	12,098
Galle	..	48,534	950	5,294	68,712	74,956	29·25	27·72	9·1	1,000	1,000	1,905	4,000	8,159
Matale	..	25,547	4,397	22,913	10,302	37,612	43·95	38·10	65·5	800	1,000	1,115	3,500	5,924
Badulla	..	31,085	8,035	26,351	4,746	39,130	50·80	51·47	54·8	1,200	1,000	1,124	3,000	5,216
Kalutara	..	44,749	—	6,686	63,344	70,030	31·85	31·73	11·7	850	1,000	1,480	3,000	5,530
Nuwara Eliya	..	19,138	3,254	22,198	446	25,898	58·67	45·65	62·1	—	1,000	1,508	3,000	5,737
Ratnapura	..	36,005	3,609	30,954	18,409	52,972	28·42	33·76	7·9	200	1,000	949	3,000	7,778
Moneragala	..	17,699	7,035	6,696	3,558	17,289	58·40	45·10	56·6	350	500	1,059	2,000	3,024
Total	..	1,249,160	505,991	427,282	633,897	1,567,171	38·60	38·92	—	13,600	38,500	60,138	151,500	239,768

* Source : Department of Census and Statistics.

Schedule 2

Total Costs of Paddy Production Programme showing Phasing and Foreign and Local Expenditure

(In millions of Rupees)

	1964–65	*1965–66*	*1966–67*	*1967–68*	*1968–69*	*1969–70*
Foreign Expenditure						
Fertilizer	17·5	20·0	24·5	30·0	36·5	43·5
Agro-chemicals	1·0	2·0	3·0	4·0	4·0	4·0
Spraying and dusting equipment	—	0·7	0·7	0·6	0·5	0·5
Tractors, implements and spares	4·0	19·7	19·7	13·7	7·7	7·7
Vehicles	—	0·1	0·1	—	—	—
Total	22·5	42·5	48·0	48·3	48·7	55·7
Local Expenditure						
Subsidy on fertilizer	12·0	14·0	17·0	21·0	25·0	30·0
Fertilizer Stores	0·5	1·5	2·5	1·5	—	—
Seed Paddy Stores	—	0·2	0·2	0·2	—	—
Seed Paddy Scheme	0·3	0·4	0·5	0·6	0·6	0·6
Crop Sample Survey	0·015	0·1	0·05	0·05	0·05	0·10
Total	12·815	16·2	20·25	23·35	25·65	30·70
Grand Total	35·315	58·7	68·25	71·65	74·35	86·40

N.B.—The separation of foreign and local expenditures has not been worked out in all details.

Agricultural Credit

AGRICULTURAL CREDIT

THE economy of Ceylon at the time the Island was granted independence in 1948 was largely a plantation economy based on the production of tea, rubber and coconut. Hardly any attempt had been made to increase the very low level of productivity of the peasant sector which consisted of subsistance farmers engaged in the production of food crops, as these could be readily imported with the foreign exchange earned by the export of tea, rubber and coconut produce. The need to create conditions in which this sector could make a significant contribution to the economy was first realised during the period 1939 to 1945 when it was not possible to import adequate foodstuffs to meet the deficit owing to the conditions created by the Second World War. The Short-Term Programme for increased food production by the peasant sector which was then adopted was found to be greatly retarded by the disadvantageous economic circumstances of peasant farmers on account of the lack of credit and marketing facilities, amongst other factors.

2. Government therefore adopted a policy of making credit for agricultural production available to the peasant sector through Co-operative Societies. The volume of credit granted annually by Government to Co-operative Societies is as follows :—

Year	*Loans granted* *Rs.*	*Recoveries* *Rs.*	*Balance out-standing* *Rs.*	*Loans in default* *Rs.*
1947–48	4,356,000	2,544,000	1,812,000	N.A.
1948–49	5,563,000	2,040,000	5,335,000	N.A.
1949–50	4,247,000	3,654,000	5,924,000	N.A.
1950-51	6,695,000	4,147,000	8,472,000	N.A.
1951–52	8,836,000	7,420,000	9,888,000	N.A.
1952–53	15,864,000	7,428,000	18,324,000	N.A.
1953–54	11,709,000	11,305,000	18,728,000	N.A.
1954–55	14,674,000	15,030,000	18,372,000	5,940,000
1955–56	18,370,000	17,512,000	19,230,000	4,460,000
1956–57	21,934,000	21,787,000	19,377,000	6,488,000
1957–58	13,809,000	12,544,000	20,642,000	7,888,000
1958–59	18,382,000	13,022,000	26,002,000	12,304,000
1959–60	13,961,000	13,815,000	26,148,000	16,766,000
1960–61	11,406,000	13,395,000	24,159,000	17,236,000
1961–62	12,618,000	13,134,000	23,643,000	17,467,000
1962–63	10,667,000	9,462,000	24,848,000	18,219,000
1963–64	34,588,000	16,200,000	43,200,000	25,894,000
1964-65	27,500,000*	16,500,000*	54,200,000*	34,000,000*

3. Government credit to Co-operative Societies is channelled through an Advance Account operated by the Department of Agrarian Services. When the People's Bank was set up by Government in 1960 to provide amongst other things rural credit of types that cannot be provided by normal commercial banking institutions, it was envisaged that the provision of credit to Co-operative Societies would ultimately be channelled through this Bank, which has already established 43 branches in the major towns of the Island. However, owing to the high rate of risk involved in granting agricultural loans to Co-operative Societies and organizational difficulties, the Department of Agrarian Services continues to operate the scheme.

4. When the Agricultural Credit Scheme was inaugurated in 1948 loans were granted through Co-operative Agricultural Production and Sales Societies. The growth of such Societies during the initial years was so low that only a small minority of peasant cultivators were able to join them. The number of such societies increased from 189 in 1949 to 955 in 1956, and in the latter year their total membership was 234,636. It was decided in 1957 that the Co-operative Agricultural Production and Sales Societies should gradually be replaced by Multi-purpose Co-operative Societies providing a greater variety of services and operating in more compact areas. The number of such Societies increased from 3,908 in 1958 to 4,950 in 1963, and in the latter year their total membership was 785,726. In that year there were also 603 Societies of the former sort functioning in areas which had been reduced to be on par with those served by Societies of the latter sort and having a total membership of 63,244. Although a survey conducted in 1957 indicated that about 9 per cent. of peasant farmer families had not joined Co-operative Societies because the nearest Society was too far away from their village, it has not been possible to establish a larger number of Societies as they cannot operate economically in the more sparsely populated areas.

II. Expansion of the Credit Scheme in 1963

5. The scope of the Agricultural Credit Scheme was greatly expanded in 1963 on the recommendations of a Committee which examined the working of the Scheme. As the information gathered by the Committee indicated that—

(a) institutional credit for agricultural purposes was available only to members of Co-operative Societies and about 35 per cent. of peasant farmer families were not members of such Societies ;

(*b*) about one third of the Co-operative Societies were not being given further loans because they had defaulted in the repayment of earlier loans granted to them, and even the non-defaulting members of such Societies were unable to obtain further loans ;

(*c*) about half the total membership of Co-operative Societies had become share capital defaulters and had therefore lost the rights of membership, including the right of obtaining loans ; and

(*d*) the only security furnished by members taking loans was their share capital and an undertaking that they would repay the loans.

it was decided that—

(*i*) the Guaranteed Price Scheme law should be amended to confine purchases of produce under it to members of Co-operative Societies (so that almost all peasant farmers would be compelled to join such Societies) ;

(*ii*) the Co-operative Societies law should be amended to provide for the compulsory recovery of share capital instalments from the payments due to members under the Guaranteed Price Scheme (so that members would cease to lose their rights of membership on account of share capital default) ;

(*iii*) further loans should be granted to Co-operative Societies which had defaulted in the repayment of earlier loans, for distribution amongst non-defaulting members of such Societies only (so that such members could continue to obtain loans and there would be an incentive for all members to pay up their share capital and repay their earlier loans) ; and

(*iv*) before obtaining short-term loans, members should be asked to give an undertaking that that they would sell enough produce from their next harvest to the Society to enable it to recover all the loans taken by them (so that the security offered would be equal in value to the loans granted).

t was anticipated that these measures would lead to a situation where lmost all peasant farmers became members of Co-operative Societies, ere able to obtain adequate loans for their production needs and eased to default in the repayment of their loans.

6. Although members had been eligible to obtain loans up to s. 175 per acre for paddy cultivation even before 1963, those owning ore than 1½ acres had not been able to do so as they generally owned

only one share of Rs. 50 in their Co-operative Society and their maximum credit limit was deemed to be 5 times the value of their share capital, i.e., Rs. 250. The maximum credit limit of paddy cultivators was therefore raised to Rs. 500 per share, if their land was cultivated once a year, and Rs. 750 per share if their land was cultivated twice a year. Thus a member with one share could obtain all the loans required for the cultivation of 3 acres and a member with two shares could obtain all the loans required for the cultivation of 5½ acres. This change, along with those indicated in the preceding paragraph resulted in Rs. 32,492,179 being .given out by way of loans for paddy cultivation in 1963-64 as against a total sum of Rs. 10,667,000 given out by way of loans for all purposes in 1962-63.

7. Loan schemes for the cultivation or red onions, bombay onions, chillies, potatoes and pineapples were also introduced in 1963. Details of these schemes are given below.

III. Limitations of the Scheme

8. It is generally acknowledged that a comprehensive scheme of agricultural credit for small scale peasant farmers should provide adequate coverage to relieve them of their previous indebtedness to money lenders and other undesirable suppliers of rural credit, to meet their needs for short, medium and long term production credit, and to supply a part of their essential consumption requirements in between harvests. Since their impoverished circumstances preclude peasant farmers both from providing the funds required to finance such a scheme and from offering commercially acceptable security for the loans they require (such as the mortgage of lands with clear title) special institutional arrangements have to be made to serve them. One form which these arrangements can take is the setting up of Multi-purpose Co-operative Societies which obtain the greater part of their initial funds from Government, offer loans to their members to be recovered from the produce surrendered by members to them for marketing, and generate more funds for themselves by holding in deposit the proceeds of the sales of members' produce to be withdrawn on demand by the latter, as well as by earning profits from the marketing activities.

9. Although the Co-operative Societies set up in Ceylon were intended to meet these institutional needs and do engage in all these activities, they have not yet been able to do so efficiently for a number of reasons. Chief amongst these is perhaps the role that Government has expected them to play. From the point of view of Government, the benefits of the Agricultural Credit and Guaranteed Price Schemes had to be made available to the entire farming population

from their inception, and the only way in which this could be done was by calling upon the Co-operative Societies to execute these programmes as best as possible with the limited resources available to them. For example, each of the Co-operative Agricultural Produce and Sales Societies which existed during the period 1948 to 1957 were expected to grant membership and loans to eligible farmers scattered over a large number of villages which had no essential connection with the town in which the Society's office was situated, and this meant that the Society was unable to reach its members unless they came to it for further aid. Similarly, both types of Societies were expected to purchase produce under the Guaranteed Price Scheme from the entire farming population in their areas, i.e., from non-members as well as from members. Since they were unable to purchase a substantial portion of the produce that might be brought for sale owing to the lack of adequate storage, they were in no position to insist on members' surrendering enough produce to them for full recovery of the loans granted by them.

10. While Co-operative Societies were therefore unable to avoid defaulting in the repayment of loans taken by them, Government was compelled to give them further loans for distribution to non-defaulting members. Thus further loans were given at one time only to Societies which had defaulted in less than Rs. 5,000; they were later granted to Societies which showed that a higher volume of credit resulted from crop failure or other unavoidable circumstances; and after the expansion of the credit scheme in 1963 they were also granted to Societies which had defaulted in the repayment of larger sums, for distribution to their non-defaulting members. The principle of corporate responsibility has thus been modified and most Societies have tended to be lax in the recovery of loans granted by them to their members. This is one reason why loan repayments to Government, which were more or less equal in volume to the fresh loans granted during the period 1953/54 to 1962/63 (except for the year 1958/59) have not kept pace with the new loans granted after the expansion of the credit scheme in 1963 as indicated in paragraph 2 above. It may therefore be expected that if Government does not enforce a water-tight scheme for the recovery of loans by Co-operative Societies the current pattern of massive default is likely to continue unchanged.

11. Althought the provisions in the expanded credit scheme of 1963 for the liberalization of credit were implemented without delay, the provisions for ensuring the recovery of loans have remained in abeyance. Thus the proposed changes in the Guaranteed Price Scheme law and the Co-operative Societies law (referred to in paragraph 5

above) were enacted only towards the end of 1964, i.e., one year after the implementation of the expanded credit programme. As the then Government directed that the change in the former law should not be implemented for the time being (i.e. that produce should continue to be accepted from non-members) the amendment to the Co-operative Societies law has remained a dead letter, since members have only to sell their produce through non-members to avoid loan repayment.

12. The proposed change in the type of security to be offered by members has not yet been made, and in any event it would not serve the purpose as produce is accepted from cultivators under the Guaranteed Price Scheme in instalments and they must necessarily be given some payment in cash for their immediate consumption needs against the first instalments surrendered by them. A proposal to call upon members to give an enforceable undertaking to surrender a specified quantity of produce adequate in value to enable the Societies to offer them a specified cash payment against the first instalment of produce surrendered, as well as to recover all dues from the balance payable for the first instalment and from subsequent instalments, is now under consideration.

13. Until all these changes in the laws which have a bearing on loan recoveries are fully implemented and adequate measures of supervision are devised to ensure that they are not evaded, Co-op. Societies will not be able to operate the Agricultural Credit Scheme efficiently. The number of individual loan defaulters is likely to increase and this will result in a reduction in the volume of fresh loans granted, as individual loan defaulters are not eligible to receive further loans. It will be observed that the volume of loans granted has already dropped from Rs. 34,588 million in 1963-64 to Rs. 27,500 million in 1964-65. If the proposed changes are not implemented the volume of loans granted annually is likely to continue on a downward trend.

14. Although the volume of loans in default may not be excessive in relation to the total volume of loans granted, it has proved to be a major obstacle to the generation of financial resources by Co-op. Societies themselves. As so many Societies are 'in the red' members generally purchase the minimum of one share (recoverable in ten half-yearly instalments) which enables them to obtain the benefits of membership and they cannot of course be persuaded to let the proceeds of the sale of their produce remain in deposit with the Society until actually required by them.

15. The current arrangements for the supervision of credit are based on a division of responsibility between the Department of Co-operative Development (which is expected to overlook the financial aspects of transactions involved) the Department of Agriculture (which is expected to check the use made by members of the loans taken by them) and the Department of Agrarian Services (which grants loans to Societies and collect repayments with the aid of reports furnished by the other two Departments). It is somewhat difficult to co-ordinate these arrangements satisfactorily, particularly as Co-operative Societies themselves have many other functions not connected with agriculture, e.g., the supply of consumer goods. Many instances of credit being granted to members of Co-operative Societies who are not cultivators and of credit being granted for cultivation operations which cannot in fact be performed have come to light, but under the present arrangements this occurs too long after the event for corrective action to be taken.

16. The possibility of entrusting the operation of the Agricultural Credit Scheme gradually to the Cultivation Committees set up under the Paddy Lands Act could therefore be kept in view. Cultivation Committees unlike Co-operative Societies are intimately concerned with day to day cultivation operations and they may therefore be able to manage and supervise the Agricultural Credit Scheme more soundly than the latter. Government supervision of the scheme could then be effected through the Department of Agrarian Services which in any event supervises the functioning of Cultivation Committees. Changes on these lines are being considered at present, but it is likely that the major part of agricultural loans will continue to be channelled through Co-operative Societies for some time to come.

17. A comprehensive survey of the credit requirements of the peasant sector has not yet been undertaken. The sample surveys conducted by the Departments of Agrarian Services and Co-operative Development in 1957, and by the former and the Department of Census and Statistics in 1962 indicate very roughly the extent and the nature of rural indebtedness, although their findings are likely to be subject to varying degrees of error. According to the 1957 survey, the total debt of the rural sector at that time was approx. Rs. 510 million of which approx. Rs. 245 million was owed to 'undesirable sources of credit'. According to the same survey the total annual credit needs of rural families were Rs. 220 million, and the funds required for the purpose of supplying their current needs would vary between Rs. 110 million and Rs. 165 million.

18. According to the 1962 survey, 65 per cent. of peasant farming families were members of Co-operatives. Of the balance, 35 per cent who were non-members, 15 per cent. said that their own capital resources were sufficient, while 14 per cent. said that they were in a position to obtain easier credit from other sources such as friends and relations. The balance 71 per cent. would appear to need credit from Co-operatives, as the reasons given by them for non-membership were that the Society was too far from their village (26.5 per cent.); that they had no confidence on the Society (17.1 per cent.) ; that they had been refused membership, were indifferent or were too poor to become members (9.3 per cent.) ; and reasons not stated (17.5 per cent.). It may be correct therefore to say that a further 25 per cent of the total number of peasant farming families do in fact need credit from Co-operative Societies along with the 65 per cent. who are already members. Assuming that the cost of cultivation of an acre of paddy land is Rs. 250 of which credit is required up to Rs. 175 and that the total acreage cropped per year is Rs. 1.7 million, the total volume of credit required will be Rs. 197,500,000 less a deduction of 10 per cent. on account of those farming families which have other suitable sources of credit. Allowing for other factors, the volume of short-term production credit required by the present sector annually may therefore be in the region of Rs. 150 million.

19. Government has so far confined itself to making Agricultural Credit available only for production purposes. These may be classified as follows :—

(i) Short-term loans offered through Co-operative Societies to farmers for cultivation operations and the purchase of seed materials and fertilizer ;

(ii) Medium-term loans offered through Co-operatives to farmers for purchase of agricultural machinery and requisites ;

(iii) Long-term loans offered to Co-operative Societies for capital expenditure on the provision of storage, transport and milling services in connection with the Guaranteed Price Scheme.

The existing loan schemes do not make provision for debt redemption, financing of essential consumer expenditure in between harvests or financing of capital improvements to land, although it is likely that some percentage of the short-term cultivation loans taken by farmers are utilized for these purposes.

IV. Short-Term Loans

20. Over 90 per cent. of the total volume of loans granted consists of short-term cultivation loans repayable in periods of 6 months to 2 years. Loans are granted for the following purposes :—

Paddy Cultivation

The items for which loans are granted, the rates per acre at which they are granted and the amount granted for each item during the year 1963/64 are as follows :—

Item	*Rate* *Rs.*	*Total amount granted during 1963–64* *Rs.*
Seed paddy ..	24 per acre ..	4,206,055
Ploughing ..	40 „ ..	16,993,155
Fertilizers ..	36 „ ..	4,278,932
Transplanting ..	25 „ ..	1,634,741
Weeding ..	25 „ ..	2,464,081
Harvesting ..	25 „ ..	2,915,215
	Total	32,492,179

Subsidiary Food Crops

21. The loan scheme for the cultivation of subsidiary food crops was introduced at the beginning of the year 1963/64. Loans are granted for the following purposes :—

Cultivation of red onions :

Item	*Rate* *Rs.*
Seed onions	100 per quarter acre
Fertilizers	75 „
Insecticides	25 „
Total ..	200

Cultivation of irrigated chillies :

Item	*Rate* *Rs.*
Labour	75 per quarter acre
Green manure	75 „
Fertilizers	50 „
Total ..	200

Rain fed chillies :

Item	*Rate* Rs.
Ploughing	40 per acre
Labour	50 „
Fertilizers and insecticides	35 „
Total	125 „

Potatoes :

Item	*Rate* (*per one eigth acre*) *Rs.*
Labour	40
Seed potatoes	125
Inorganic fertilizers	25
Organic fertilizers	35
Insecticides	25
Total	250

22. The volume of loans granted in 1963-64 for the cultivation of subsidiary food crops was Rs. 81,808. The volume of loans granted in 1964-65 for the same purpose was Rs. 895,487. In view of the proposed programme for bringing 40,000 acres of irrigated land under cultivation with these crops, the projected volume of loans required for their cultivation during the next 5 years is as follows : —

Year	*Amount of loans granted* (*Rs. million*)
1965–66	1·2
1966–67	1·5
1967–68	2·0
1968–69	3·0
1969–70	5·0

Cultivation of Pineapples

23. The loan scheme for the cultivation of pineapples was introduced at the beginning of 1964 and the volume of loans granted during 1964-65 was Rs. 214,861. About 4,000 acres are cultivated under pineapples at present and as the expansion of the acreage is dependant on the provision of adequate canning facilities, the rate of increase of the acreage under pineapple is likely to be steady rather than rapid.

V. Medium-Term Loans

24. Medium-term loans are granted to farmers through Co-operative Societies mainly for the purchase of agricultural machinery and implements. These loans are repayable in periods of 2 to 5 years. The main items for which loans are granted and the total amounts granted during 1963-64 are as follows :—

Item	*Amount granted* *Rs.*
Purchase of sprayers	8,870
Purchase of agricultural implements	308,344
Purchase of buffaloes	1,200
Purchase of barbed wire	266,698
Purchase of water pumps	268,267

VI. Long-Term Loans

25. Long-term loans are granted by Government to Co-operative Societies for capital expenditure required in connection with their production and marketing functions. The main items for which loans are granted and the total amount granted during 1963-64 are as follows :—

Item	*Amount* *Rs.*
Construction of produce stores by Co-op. Societies	184,692
Construction of rice mills	294,042

26. A loan scheme for the construction of 50 ton capacity fertilizer stores by Co-operative Societies at a cost of Rs. 7,500 per store is under submission to Cabinet for approval. This scheme will enable Co-operative Societies to stock fertilizer in advance and sell it over the counter to cultivators. At present many Societies get down stocks of fertilizer only against orders placed by cultivators, and this is one of the major limitations on the use of fertilizer in paddy cultivation. The projected volume of loans required for the construction of these fertilizer stores during the next five years is as follows :—

Year	*No. of stores to be constructed*	*Amount of loans granted Rs. (million)*
1965–66	200	1·5
1966–67	200	1·52
1967–68	260	1·55
1968–69	340	2·25
1969–70	500	3·75
Total	1,500	10·60

VII. **Marketing Loans and Advances**

27. Over-draft facilities are now granted by the People's Bank to Co-operative Societies for the purchase of produce under the Guaranteed Price Scheme. Marketing advances are granted to cultivators from the Advance Account of the Guaranteed Price Scheme about 2 weeks before their fields are due for harvesting and these are recovered from the produce surrendered by them. These forms of credit have not been taken into account in the projected expenditure under the Agricultural Credit Scheme which is outlined below.

VIII. **Projected Credit Requirements**

28. As no major expansion of the Agricultural Credit Scheme is envisaged at the present time the programme of work for the next 5 years is based on the extension of the benefits of the current scheme to a larger number of cultivators and Societies by way of amending the laws and procedure for ensuring that they become members of Co-operative Societies, obtain adequate loans for their production needs and cease to default in the payment of share capital and the repayment of loans. The projected figures of loans required by paddy cultivators are based on an increase of 10 per cent per year. Those required by cultivators of subsidiary food crops are based on the particulars given in paragraph 22 above. Those required by Co-operative Societies for the construction of village level fertilizer stores are based on the particulars given in paragraph 26 above.

	1965–66 *Rs.* *(million)*	*1966–67* *Rs.* *(million)*	*1967–68* *Rs.* *(million)*	*1968–69* *Rs.* *(million)*	*1969–70* *Rs.* *(million)*
Short-term loans :					
Paddy	25·0	27·0	30·0	35·0	40·0
Subsidiary crops ..	1·2	1·5	2·0	3·0	5·0
Medium-term loans :					
Miscellaneous	2·0	3·0	4·0	5·0	6·0
Long-term loans :					
Go-downs	·4	·8	1·2	1·6	2·0
Fertilizer stores	1·5	1·5	1·6	2·2	3·7
Total ..	30·1	33·8	38·8	46·8	56·7

The Paddy Lands Act

THE PADDY LANDS ACT

PADDY cultivation in Ceylon, as in other South-East Asian countries is characterised by the following circumstances, from the land tenure point of view :—

(i) the land is held in very small holdings—about 64 per cent. of the holdings are below one acre each, about 31 per cent. below half acre each, about 85 per cent. below 2 acres each ;

(ii) only about 60 per cent. of this land is owner cultivated. About 25 per cent. to 30 per cent. of paddy lands are cultivated by tenants ; and

(iii) cultivators as a consequence are generally indebted, cannot invest much capital other than their labour in production and are victims of a vicious cycle where poor economic circumstances result in low production.

In order to reform this system of tenure, the Government in 1958 introduced the Paddy Lands Act. The 1958 Act has been thrice amended to overcome legal difficulties. The objectives of the Act are in summary, to—

(*a*) give tenant cultivators a permanent and secure right to their land, and incentives to increase production. The Act consequently makes evictions of tenant cultivators an offence and provides for their restoration if evicted ; requires them to pay only a fair rent to their landlords, generally not exceeding 25 per cent. of their produce, limits interest rates on loans by landlords and contains mechanism for enforcing these measures. Tenancy is also made a hereditory right, which a tenant can gift, transfer or pass on to a named heir ;

(*b*) limit fragmentation in a small way, protect rights of agricultural labourers and enforce on all cultivators, whether owner-cultivators, tenant cultivators or landlords cultivating with agricultural labour, an obligation at all times to cultivate their lands efficiently, failing which there are penalties, culminating in dispossession of the land ; and

(c) provide at village level an organization—the Cultivation Committee composed of the cultivators themselves, which will—

(i) take control of the communal aspects of paddy cultivation, such as the control and issue of water, and the management of cultivation within the tract, in the majority interest ;

(ii) organize the cultivators through self-help and allied devices to mobilise their energies to meet local problems such as the provision of small drainage and irrigation problems, pest and animal damage, etc. ;

(iii) function as a supply and service institution at the village level by providing cultivators with required agricultural supplies such as fertilizer, agro-chemicals and implements, and with services such as spraying, dusting, pumping out and pumping in water, etc. ;

(iv) act as an institutional device to protect the interests of the tenant cultivator and the small owner cultivator by collecting and paying to landlords legal rents, guaranteeing loans to cultivators from other institutional sources, initiating schemes for consolidation of holdings, etc. ; and

(v) serve as a forum for cultivators through which they could ventilate their grievances and needs to Government and through which Government could channel services, extension, etc., to them.

Below are the observations of the implementing Department regarding the degree to which it has been possible to enforce the provisions of the Act, the difficulties that has been encountered in its implementation, proposals that may circumvent some of these difficulties and certain other aspects that might be worthy of further consideration. These are dealt with in two parts—Tenancy Provisions and the Organization of Cultivation Committees.

PART 'A'

Tenancy Provisions

The Department has up to date received a total of approximately 27,000 complaints of eviction. Of this number about 24,000 have been inquired into. Of these cases where inquiries have been completed, restorations have been effected in about 20 per cent. of the cases; in about 40 per cent. of the cases decisions against the complainants have been taken ; about 20 per cent. more have been laid by, pending amendments to the Act, and are now due to be taken by, since the amendments have become law, and in the balance 20 per cent. action in restoration of the tenant is pending.

In summary therefore there are—

(a) about 8,000 cases awaiting inquiry for the first time, or re-inquiry after the Amending Act for 1964 ;

(b) about 5,000 cases decided for the complainant, where the Department has to take action to restore him to his tenancy if necessary by recourse to Court ;

(c) in addition, the Supreme Court has recently held that Assistant Commissioners of Agrarian Services have no power to hold eviction inquiries and this is now under appeal ; and

(d) in general under present procedure and with existing staff available, it takes about 3 years to restore an evicted tenant. Landlords therefore evict with impunity any tenant who attempts to pay the legal rent.

It is evident therefore that the estimated 300,000 tenant cultivators in the Island can have but little confidence in the effectiveness of the provisions of the Act offering security of tenure and the right to pay a fair rent. The disposal of the backlog of eviction cases is an urgent requirement. The Department has submitted proposals to increase the cadre of Temporary Assistant Commissioners and attendant clerical staff on a three-year basis for this purpose on the assumption that the Court of Appeal will hold for the Department in regard to (c) above. (Please see Schedule I annexed). In the event the Court of Appeal holds against the Department, it will be necessary that Government bring in remedial legislation.

To those who are tenant cultivators, the Act provides a legal situation whereby they could expect to cultivate their lands without fear of any form of threat or interference. The dimensions of the problem of evictions and threats to tenant cultivators are such that it will not be possible for the implementing Department alone to undertake the task of affording the necessary protection to the tenant cultivators. Steps are therefore being taken to secure the assistance of the Police Department, so that the Police could take action in instances where the rights of tenant cultivators are being interfered with.

The other factor that influence the effective implementation of the tenancy provisions is the patriarchal relationship that yet exist to a large measure between the landlord and the tenant in Ceylonese villages. The continuance of this situation is due largely to the failure of the Governmental, Co-operative or other village level organizations to serve the peasant farmer efficiently. The availability of credit plays a significant role and when institutional credit is not forthcoming a tenant cultivator is left with the alternative of obtaining this need either from the village trader or his ladlord—the landlord being by far a source that is less harmful to the peasant farmer. These circumstances places the tenant cultivator in an disadvantageous position in any attempt to curb the privileges that a landlord had enjoyed for a long time. With the successful implementation of the proposed rural credit programme the position should certainly change.

Consideration of the paddy land exclusively in a Land Reform Project, while some similar provisions are not made available in respect of the high land appears to be yet another short-coming in the implementation of the tenancy provisions. In defining the paddy lands, the Paddy Lands Act included high land adjoining the paddy land in which a tenant farmer could reside. In fact, however, it has an exception rather than a rule to find the homes of peasant farmers spread round a perimeter of paddy tract. The homes of the tenants are more usually in blocks of high land that may belong to some landlord but not adjoining a paddy land in which he is a tenant. It is unlikely that a tenant will try to press his advantages regarding a paddy land if he is not that certain of being afforded protection regarding high land in which he has his home.

Paddy cultivation in Ceylon is far from being a commercialised activity. The rural economy is yet quite a distance away from complete monetization. This could be seen from the fact that even despite the attractive guaranteed price that is being paid for paddy today, only about 45 per cent. of the production is sold under the G. P. S. direct by cultivators. Paddy cultivation is yet a way of life, deeply rooted in custom and tradition having a social attitude hostile to change. However, it is essential that this out-look is changed if the peasantry is to achieve a break-through from the quasi-subsistance level of agriculture to commercialized farming. For this country the maintenance and increase of agricultural production is of utmost importance and ways may be found which will increase the incentives to produce more and invest more in the land.

Transfer of Ownership to Tenants

Considering the difficulties that has necessarily to be faced in attempting to provide security of tenure it may be useful to explore the possibility of transferring owner-ship to the tenant cultivator.

Many an authority on land reform are agreed that a re-distribution scheme from tenants to owners would improve the accretionary process. The Paddy Lands Act has provisions for a Cultivation Committee or the Commissioner to formulate schemes to transfer ownership to tenant cultivators. Such a scheme when finalised is to be implemented by regulations under the Act.

However, objective studies have to be made before proceeding on such schemes. In a peasant system such as ours land ownership is more or less equally distributed. Data is not available of the number of tenant cultivators who are actually completely landless. Invariably, the cultivator while being a tenant in one parcel of land is the owner cultivator of another. It will also be a difficult task under the present conditions to make ownership permanent, because holdings are so small and because consumption perpetually tends to outrun production, the cultivator is always under pressure to re-sell his holding. Rendering land altogether inalienable would both remove incentives to improve and restrict the use of credit with land as colateral.

It is estimated that about 400,000 acres of paddy land are under some form of tenancy. If this acreage is to be transferred the present owner will have to be compensated with a sum of roughly Rs. 600 million. Careful consideration has to be given as to how this large amount could be released to the country without creating inflationary pressures and of the avenues available for re-investment of this money. Studies are being made of these and other aspects with the object of giving affect to the proposal of passing ownership to tenants.

PART 'B'

Organisation of Cultivation Committees

Cultivation Committees are elected from and by owner-cultivators and tenant-cultivators of paddy lands. A Committee is composed of 12 members who hold office for three years. Each of these Committees cover about 400 acres of paddy land and are vested with strong legal powers under the Paddy Lands Act in the management of paddy cultivation. About 3,500 of these Committees have been set up since 1958 and about 500 more are presently being formed in the areas of Paddy Colonization Schemes. When this is completed, Cultivation Committees will cover the entire paddy area in the Island.

Since their inception Cultivation Committees have undertaken programmes bringing direct benefits to the paddy cultivators. One of the major interests of the Cultivation Committees had been the promotion of irrigation facilities. Between 1958 and 1965 these Committees had undertaken and completed Minor Irrigation Contracts from the Government to the value of Rs. 8.5 million and completed self-help schemes where the Committees contribute 50 per cent. of the value of the work in labour while the Government contributes the rest to the value of about Rs. 600,000.

These Committees had also taken an interest in securing the execution of maintenance functions under the Irrigation Ordinance and in executing the regulatory functions entrusted to them under the same Ordinance. The fact that 11,015 prosecutions were entered during the Financial Year 1963/64 in Rural Courts for violation of Irrigation Rules, while a further 7,807 cases were entered during the Financial Year 1964/65 is evidence of this interest. In addition, a large number of disputes and problems relating to irrigation and water disputes are settled amicably by Cultivation Committees without resorting to Court action.

Many Committees spent part of their funds in further subsidising fertilizer purchased by them on behalf of their members under the Fertilizer Subsidy Scheme from the Government organising cultivation competitions and in the purchase of pest control equipment and agro-chemicals.

To execute the decisions of the Cultivation Committees these bodies appoint Govi Mandala Sevakas and Irrigation Agents. In 1964 1,335 Govi Mandala Sevakas had appointed 6,689 Irrigation Agents who attend to irrigation functions under their control and supervision.

The Cultivation Committees are empowered to charge a levy from each cultivated paddy land every season, the greater portion of the money so collected being utilised for the payment of the Govi Mandala Sevakas and Irrigation Agents and for the maintenance of an office. During the past few years collections of the acreage levy had increased progressively—Rs. 832,441.14 in 1962/63 ; Rs. 1,134,700.39 in 1963/64 and Rs. 2,003,220.49 in 1964/65. With approximiately 1.5 million acres of paddy land being cultivated in the Island for the two seasons each year, collections should be around Rs. 9 million. Therefore it is evident that finances available to the Cultivation Committees are yet far from satisfactory. The Cultivation Committees could be expected to offer a satisfactory service to the cultivators only if they are able to employ executive officials and have an organised office where records could be maintained. Failing this, Cultivation Committees become loose-knit organisations which are not disciplined enough to perform a satisfactory service.

Cultivation Committees are now entrusted with the preparation of Crop Lists, which are estimates to yields in respect of each parcel of paddy land and is used for the purchase of paddy under the Guaranteed Price Scheme. These Committees are also the primary reporters of paddy data for the Department of Census and Statistics. With the amendments introduced in 1964 Cultivation Committees are also entrusted with the task of preparing Paddy Lands Registers which would enumerate all parcels of paddy land within each Cultivation Committee area and also list the interests of persons such as owners and tenants in respect of each paddy parcel. Once certified these documents will be prima facie evidence of all interests in respect of any paddy land in the Island.

It would be evident from the facts given above that Cultivation Committees had in fact performed very useful services to the cultivators, but what has been done is yet far from adequate. Action has to be taken to see that all Cultivation Committees are uniformly efficient in catering to the needs of the cultivators.

The importance of this organisation lies in the fact that this was the first instance where leadership was offered to the paddy farmer. Traditionally leadership in the village had been with the older well established families ("respectable folk") the professional classes such as the Village School Teacher and the Village Physician and to some extent the merchants and traders. This was a historical development leading from the old feudal society. The peasant farmer had been content to carry on his work without actively participating in village level organisation. This had resulted in the passing of control of village level organisations to groups of people who did not have common interests with the peasant farmer. Even with the formation of Cultivation Committees this trend was noticed in certain areas where the peasant farmer who were legitimately eligible to be the sole membership of the Cultivation Committees were content to see village financiers who were not cultivators assumed offices in the Cultivation Committees. It is iof utmost mportance therefore, to educate the peasant farmer to take an active interest in his own affairs and assume leadership in managing his own affairs. Farmer education is considered to be a very important aspect in a take-off period of development. This is necessarily a slow process but a very important one. To achieve efficiency at Cultivation Committee level it is necessary in that formative stage to have a very close supervision of the organisation, but the present staff at the field level is not adequate for the purpose. Schedule II below shows the distribution of Cultivation Committees in each district and the number of available Divisional Officers and Agrarian Services Oversees in these areas who are responsible for the guidance and supervision of Cultivation

Committees. To remedy this situation action is being taken to explo the possibility of using the extension staff of the Department of Agr culture so that the Food Production Overseers of that Departmen could be assigned Cultivation Committee areas.

Schedule I

(Provision is necessary only for 3 years)

		Rs.
1.	14 Temporary A.C.A.SS. Rs. 400 p.m. for 36 months ..	201,600
2.	Travelling for 14 A.C.A.SS. at Rs. 200 p.m. for 36 months ..	100,800
3.	28 G.C.E. clerks at Rs. 80 p.m. for 36 months	80,640
4.	C.L.A. and S.L.A. for same at Rs. 111·50 p.m. for 36 motnhs ..	112,392
		495,432

N.B.—There are approximately 13,000 cases awaiting disposal. The cost per inquiry, up to time of final disposal is therefore Rs. 40.

Schedule II

	District	*Asweddumized Paddy Acreage*	*Number of Cultivation Committees*	*Number of Divisional Officers*	*Number of Agrarian Services Overseers*
1.	Colombo	65,395	328	8	15
2.	Hambantota	44,320	171	4	15
3.	Kurunegala	48,478	469	14	28
4.	Ratnapura	36,005	160	4	8
5.	Kegalle	27,329	147	4	11
6.	Kandy	46,522	198	5	12
7.	Kalutara	44,749	210	5	10
8.	Galle	48,534	219	6	13
9.	Matara	49,404	196	6	11
10.	Chilaw/Puttalam	32,720	89	3	11
11.	Anuradhapura	126,115	295	10	46
12.	Matale	25,547	91	3	10
13.	Batticaloa	98,905	129	7	18
14.	Badulla	31,086	120	4	12
15.	Nuwara Eliya	18,138	83	3	8
16.	Moneragala	17,700	56	3	8
17.	Polonnaruwa	60,416	30	2	11
18.	Amparai	104,727	105	7	18
19.	Jaffna	80,649	147	7	15
20.	Vavuniya	56,431	74	5	10
21.	Mannar	34,037	60	3	4
22.	Trincomalee	48,478	78	3	6
	Total ..	1,249,156	3,455	116	295

Minor Irrigation

MINOR IRRIGATION

PART I

THE total asweddumized area or the total area of land prepared for the cultivation of paddy on a settled basis, in the Island is 1,249,156 acres. From the point of view of irrigation facilities, this area can be divided up as follows :—

	Acres
(i) Extent under Major Irrigation Schemes	365,949
(ii) Extent under Minor Irrigation Schemes	370,411
(iii) Extent Rainfed Irrigation Schemes	512,796
	1,249,156

It will therefore be seen that approximately 70 per cent. of the area under paddy suffers from the lack of a controlled and secure supply of water.

The provision of irrigation facilities under Major Schemes, or schemes under which irrigation rates are paid by the beneficiaries of such schemes, is the responsibility of the Department of Irrigation. The provision of better irrigation facilities to the area served by existing Minor Schemes (or schemes where the proprietors do not pay any rates, but undertake the maintenance themselves) as well as the provision of similar facilities to the Rainfed area is the responsibility of the Department of Agrarian Services.

The Department undertakes in addition, responsibility for organising the better management of paddy lands, by the enforcement of Irrigation Rules, and of the observance of the traditional practices and customs regarding cultivation. This is secured through village level organisations of the cultivators themselves, known as Cultivation Committees, one of whose chief statutory functions, is the management and control of water.

The Department handles minor irrigation work up to Rs. 7,500 with its own staff. From Rs. 7,500 to Rs. 20,000 jobs are done on the advice and approval of the Divisional Irrigation Engineer (of the Irrigation Department) of the area. Works between Rs. 20,000 and Rs. 30,000 which is the upper limit, are done only with the approval of the Ministry.

The total number of works undertaken by the Department during the last 5 years under the various categories is given below :

(*a*) Up to Rs. 7,500 ..	6,771
(*b*) Rs. 7,500 to Rs. 20,000 ..	102
(*c*) Rs. 20,000 to 30,000 ..	3

A branch of the Department, under a Deputy Commissioner, controls this activity, which is undertaken through Assistant Commissioners for the various administrative districts. A retired Deputy Director of Irrigation and a retired Irrigation Engineer are attached to the Department, the first as Irrigation Consultant, and the other working in the Department, to advise on technical matters. At the district level, a Technical Asst. of the Irrigation Department is generally attached to the office of the A. C. A. S. and where a Technical Assistant is not available, a Cultivation Superintendent is attached. Investigations, designs, preparation of estimates and constructions are done generally by Village Cultivation Officers, who are appointed on the basis of one to every 5,000 acres. V. C. OO. are in turn assisted by one to two Irrigation Overseers.

The money spent on Minor Irrigation work through this organization, during the last 5 years has been as follows :—

	Rs. c.
1959–60	3,173,812·69
1960–61	3,229,223·51
1961–62	3,309,587·04
1962–63	4,315,937·01
1963–64	4,340,849·18

The total number of works undertaken, completed, and the total extents of land benefitted during the last 3 years as well as within the area benefitted, the extent double cropped for the 1st time, as well provided with irrigation facilities for the first time, have been as follows :—

Financial Year	*Total Number of Works Undertaken*	*Total Completed*	*Total Extent of Land Benefitted Acres*	*Of this, Total Extent Double-cropped 1st time Acres*	*Total Extent of hitherto Rainfed Land provided with Irrigation Facilities Acres*
1961–62	.. 1,436	.. 1,017	.. 62,683	.. 3,046	.. 1,756
1962–63	.. 2,517	.. 1,514	.. 70,688	.. 8,151	.. 1,438
1963–64	.. 2,737	.. 1,254	.. 90,973	.. 6,455	.. 5,079

The financial provision made for minor irrigation works in the financial year 1964-65 is Rs. 6 million, and it is expected that the entirety of this sum will be spent with corresponding benefits.

PART II

The account given in Part 1 will indicate the nature and scope of the minor irrigation work undertaken by the department at present. It is proposed, however, during the next 3 years to pay special attention to the irrigation component in the programme of work envisaged in the paper entitled, 'A Three-Year Programme to increase the cropped area by 100,000 acres.' In the latter paper, proposals are made for bringing under cultivation an area of approximately 100,000 acres which is at present asweddumised but uncultivated. It is anticipated that among the many reasons for this extent of land not being cultivated at present, one of the main causes may be a lack of adequate irrigation facilities. It will be the responsibility of the Irrigation Department to rectify irrigation difficulties where they arise in that part of the area which lies under major schemes. In regard to that part of the area which lies under minor schemes as cultivated at present or where facilities have to be provided under new minor schemes, it will be the responsibility of the Department of Agrarian Services to provide these facilities.

2. A definite increase can therefore be forecast in the content of minor irrigation work from the point of view of this new programme. The financial provision suggested in a later paragraph for the Five-Year period will include the additional funds required for this programme. In the absence of detailed investigational data as to the causes of non-cultivation of this extent, it is not possible at present to forecast what extent of the area benefitted will lie in the minor irrigation segment.

3. As this special programme will be undertaken in addition to the normal minor irrigation programme of the department, it will be necessary in order to ensure that the increased financial provision for minor irrigation is properly spent that in addition to the staff presently provided, an additional 100 irrigation overseers be recruited at the rate of 50 each in the first two years of this programme. At present, the jeeps available for minor irrigation work are also not all equally serviceable and therefore provision for replacement of the jeeps at the rate of 2 per year of the programme period will have to be provided. It will also be necessary to provide for additional drawing and surveying equipment to meet the needs of the technical staff. Arrangements are being made with the Irrigation Department to obtain 22 senior T.AA at the rate of 1 for each administrative district.

4. Apart from these finance and staff requirements, however, there are 2 principal difficulties encountered in the operation of the minor irrigation work programme at present :

(i) Prior to 1958, the management of paddy cultivation rested on the provisions of the Irrigation Ordinance. Although the regulations and rules made under that Ordinance clearly laid down the duties and obligations of every person who had anything to do with paddy cultivation and provided for effective remedies whenever such duties were overlooked or neglected, the enforcement of the remedies came to be gradually relaxed almost completely in some districts, while in others such enforcement is kept to the minimum possible level. With the enactment of the Paddy Lands Act, which contained provisions dramatically opposed to those of the Irrigation Ordinance, the situation deteriorated rapidly. It was found that the provisions of either Ordinance could not be legally enforced in view of the conflicting provisions in the other. For instance the obligations of proprietors under the Irrigation Ordinance were transferred by the Paddy Lands Act to cultivators, but penalties for non-performance are enforceable only under the Irrigation Ordinance against proprietors. Likewise the Paddy Lands Act abolished village headmen, but Cultivation Committees which were substituted in their place had no status under the Irrigation Ordinance. This has led to numerous practical difficulties. From the point of view of minor irrigation under the Paddy Lands Act, it is the responsibility of the cultivator of paddy lands to contribute labour for undertaking the annual maintenance on tanks, bunds, irrigation channels, etc., while it is the responsibility of the Cultivation Committee as irrigation headmen to organise these operations and see that they are satisfactorily executed. However, since the penalties for non-performance of these operations are contained in the Irrigation Ordinance and Rules made thereunder, and since these penalties can be enforced only against the proprietors, who are not liable under the Paddy Lands Act to undertake these operations, it is not possible to compel cultivators who do not perform these labour operations to do so. The consequence has been that the maintenance of village tanks, channels, water courses, bunds, etc., has in actual fact not been done in any serious way over a great part of the country, with consequent damage to irrigation structures.

Proposals to amend the Irrigation Ordinance have been submitted about 3 years ago and the draft Amending Bill has been finalised about a year ago. It is essential that these conflicts be resolved without delay and until this is done, the management and control of paddy cultivation and the proper maintenance of irrigation structures, channels and bunds will remain largely a matter of individual preference unenforceable under the law. If this is done, much land that is not cultivated now because drainage or irrigation channels have been obstructed or diverted for other purposes or because the carrying capacity of these channels have been reduced by years of neglect, could be rendered cultivable. Failure to adhere to dates fixed for ploughing, sowing, to set up fences or for the removal of cattle from paddy fields, etc., are other notable instances, of the failure of management to make maximum use of cultivable land.

(ii) Cattle damage to irrigation structures, channels, bunds, etc. as to cultivation is at present also a matter assuming serious proportions. Prior to 1958, cattle damage was dealt with expeditiously and efficiently under the Cattle Trespass Ordinance. Since 1958, however, with the replacement of the latter Ordinance by the Animals Act, it has not been possible to deal as effectively with cattle damage as earlier. For example, under the Regulations made under the Animals Act, the responsibility of keeping an animal which has caused the damage is that of the person whose land has been damaged. The responsibility of keeping and maintaining the cattle till the penalty is paid is often irksome as the animals have to be protected against illness, thieves, etc. Further, cases of cattle damage which cannot be compounded can be tried only at Magistrates Courts and this provision also leads to serious delays. Under the Cattle Trespass Act, responsibility for keeping the animals seized until the penalty was paid, or a Court decided the matter was the responsibility of the Irrigation headmen while the court of Trial was the Rural Court. Proposals have been made to amend the Animals Act and to recast the regulations made thereunder with a view to review these difficulties. It is essential that these amendments should be effected and the regulations recast early.

5. The financial provision required, extents to be benefited under the normal and special programmes of the department from year to year and the extra staff required for the special programme, during the 5-year period commencing 1965-66 are indicated below :

TABLE I

Financial Programme and Extents Benefited

	Extent to be benefited	
Financial Year	*Financial Provision Required Rs. million*	*Under Normal Programme Acres*
1965–66	7	100,000
1966–67	8·5	110,000
1967–68	10·5	120,000
1968–69	10·5	120,000
1969–70	10·5	120,000

Extra Staff and Equipment Requirements

	Rs.
100 Irrigation Overseers at 20 per year for Years Programme at Rs. 750 per annum	60,000
10 jeeps at 2 per year of programme	100,000
Drawing and Survey Equipment at 25,000 per year	125,000
	285,000

Crop Insurance

CROP INSURANCE

THE Crop Insurance Scheme was inaugurated with the Maha Season of 1958-59 as a pilot project on an administrative basis. It covered approximately 25,000 acres in selected areas in six revenue districts for a period of four years after which it was extended to cover 65,000 acres in 11 revenue districts from the Maha season of 1962-63 and 200,000 acres in 16 districts from Maha 1963-64. Although it was intended to extend the Scheme to cover 300,000 acres by Maha 1965-66 it has not been possible to do so due to lack of staff. The proposed extension to cover 300,000 acres will take effect from the Maha Season of 1966-67.

2. The Commissioner of Agrarian Services is responsible for the administration of the Scheme, subject to the direction and control of the Minister of Agriculture and Food. At the field level, Cultivation Committees set up under the Paddy Lands Act and Multipurpose Co-operative Societies have been appointed as Agents to implement the Scheme. Under this Scheme, farmers in selected areas are compulsorily insured against loss of their paddy crop due to specified causes. The causes against which insurance protection is offered are :

1. Lack of water
2. Drought
3. Excessive water
4. Floods
5. Plant diseases
6. Insect infestations
7. Wild boar
8. Wild elephant
9. Adherence to the methods of farming approved by the Commissioner.

3. In the case of crop failure, the farmers are indemnified up to a maximum of 50 per cent. of the value of their crop. The coverages offered at present vary from Rs. 100 to Rs. 180 per acre, according to the risk and productivity of different areas. In order to provide some incentive to the farmers to adopt improved methods of cultivation, and increase their yields, a higher coverage of 10 per cent.

more than the normal coverage is offered to those who adopt such improved methods. The premium rate charged to the farmers is uniform at Rs. 6 per acre, although the actuarially computed rate is higher in certain areas. This has been possible due to the premium subsidy by the Government, in keeping with its policy that the rate charged to the farmer should not be beyond his paying capacity.

4. In July, 1963, a Committee appointed by the Government undertook a comprehensive review of the Insurance Scheme. To avoid repetition of the comments made by this Committee, a copy of its report is attached to the memorandum.

In accordance with the recommendations made by this Committee the programme for Crop Insurance during the Five-Year period will be as follows:—

Maha, 1966-67 ..	Extend the Scheme to cover 300,000 acres.
Financial year .. 1966-67	Work the Scheme in the extended area. Undertake the evaluation of the Scheme as proposed by the Committee.
Financial year .. 1967-68	Depending on the results of the evaluation, take preliminary steps and recruit staff for extending the Scheme to 400,000 acres.
Maha, 1968-69 ..	Extend the Scheme to cover 400,000 acres.
Financial years .. 1968-69 & 1969-70	Work the Scheme on 400,000 acres.

6. The proposed expansion of the Scheme district-wise will be as follows :—

District	*Present acreage Under Insurance*	*Proposed acreage*	
		1966–67	*1969–70*
1. Colombo	11,878	15,000	20,000
2. Kalutara	6,806	8,000	13,000
3. Kandy	7,961	8,000	12,000
4. Matale	—	3,000	6,000
5. Nuwara-Eliya	—	3,000	5,000
6. Galle	5,615	10,000	14,000
7. Matara	12,524	15,000	20,000
8 Hambantota	27,380	45,000	45,000
9. Jaffna	5,473	10,000	18,000
10. Mannar	—	5,000	8,000

District	Present acreage Under Insurance	Proposed acreage 1966–67	Proposed acreage 1969–70
11. Vavuniya	12,529	15,000	20,000
12. Batticaloa	11,303	16,000	24,000
13. Amparai	8,656	11,000	18,000
14. Trincomalee	5,103	6,000	10,000
15. Kurunegala	29,607	45,000	55,000
16. Puttalam-Chilaw	—	5,000	8,000
17. Anuradhapura	32,418	50,000	60,000
18. Polonnaruwa	—	5,000	10,000
19. Badulla	5,955	6,000	8,000
20. Monaragala	—	3,000	5,000
21. Ratnapura	8,155	9,000	12,000
22. Kegalle	6,299	7,000	9,000
Total	197,662	300,000	400,000

7. The staff requirements during the period 1965-66 to 1969-70 will be as given below :

	Present Approved Cadre	Staff Requirements 1966–67 and 1967–68	Staff Requirements 1968–69 and 1969–70
ACREAGE UNDER INSURANCE	197,662	300,000	400,000
NUMBER OF INSURANCE UNITS	142,800	205,200	277,400
Senior Asst. Commissioner	—	1	1
Asst. Commissioner	1	1	1
Crop Insurance Officer	1	1	1
Statistical Officer	1	1	1
Accountant	1	1	2
Shroff	1	1	2
Clerical Staff (Total)	57	79	104
(i) Operations Section	(15)	(21)	(28)
(ii) Accounts Section	(8)	(11)	(14)
(iii) District Offices	(34)	(47)	(62)
Stenographer	1	1	1
Typist	2	2	3
K. K. S.	2	2	3

	Present Approved Cadre	*Staff Requirements*	
		1966–67 and 1967–68	*1968– and 1969–*
Office Labourer	1	2	2
Telephone Operator	1	1	1
Watcher	1	1	1
Field Staff :			
Divisional Officer (Head Office)	1	1	2
Crop Insurance Inspector or Divisional Officer (Districts)	22	29	35
Field Assistants	34	47	62

Clerical staff on the basis approved by O and M :

(i) Operations Section	10,000 Units per Clerk
(ii) Accounts Section	20,000 Units per Clerk
(iii) District Offices	5, 000 Units per Clerk

Crop Insurance Inspector or Divisional Officer for Districts requested on the basis 10,000 units per officer.

Field Assistants requested on the basis of 5,000 units per officer.

8. Financial requirements during the planned period will be as given below :

	Provision in Estimates 1965–66 (Rs.)	*Financial Requirements*				
		1966–67 (Rs.)	*1967–68 (Rs.)*	*1968–69 (Rs.)*	*1969–70 (Rs.)*	*Total (Rs.)*
Premium subsidy	463,807	514,333	514,333	578,584	578,584	2,649,641
Contribution to reserve	55,000	1,538,033	—	1,137,546	—	2,730,579
Administrative expenses	454,951	610,986	660,004	773,754	836,933	3,336,628
Total ..	973,758	2,663,352	1,174,337	2,489,884	1,415,517	8,716,848

9. The details of the funds required as premium subsidy, crop insurance reserve and administrative expenses are as follows :—

Premium Subsidy

Financial Year	*Season*	*Estimated Indemnity Payable (Rs.)*	*Estimated Premium Collectible (Rs.)*	*Surplus or Deficit (Rs.)*
1956-66	Maha	1,540,507	864,724	– 675,783
	Yala	375,220	587,196	+ 211,976
	Total	1,915,727	1,451,920	– 463,807
1966-67	Maha	1,886,983	1,359,180	– 527,803
	Yala	824,070	837,540	+ 13,470
	Total	2,711,053	2,196,720	– 514,333
1967-68	Maha	1,886,983	1,359,180	– 527,803
	Yala	824,070	837,540	+ 13,470
	Total	2,711,053	2,196,720	– 514,333
1968-69	Maha	2,417,245	1,811,711	– 605,534
	Yala	1,089,360	1,116,310	+ 26,950
	Total	3,506,605	2,928,021	– 578,584
1969-70	Maha	2,417,245	1,811,711	– 605,534
	Yala	1,089,360	1,116,310	+ 26,950
	Total	3,506,605	2,928,021	+ 578,584

Estimated Indemnity Payable=Estimated Area Failing (on the basis of Crop Loss Figures over a 10-year period) X Amount of Coverage (varying from Rs. 100 to Rs. 180 per acre).

Estimated Premium Collectible—Estimated Area Sown X Premium (Rs. 6 per acre)—10% Uncollectible amount.

The Deficit each year indicates the amount of Subsidy required from the Government.

Crop Insurance Reserve

Financial Year	*Season*	*Total Insurance Liability* (*Rs.*)	*Reserve Required 7% of Liability* (*Rs.*)	*Amount in Crop Insurance Fund* (*Rs.*)	*Estimated Drain on Fund* (*Rs.*)	*Government Contribution to Reserve* (*Rs.*)
1965-66	Maha	19,256,335	1,347,943			
	Yala	12,530,880	877,162		365,721*	55,000
	Total	31,787,215	2,225,105	(As at 31.7.65) 2,096,190		
1966-67	Maha	29,952,300	2,096,661	Estimated		
	Yala	17,526,300	1,226,841	(As at 30.9.66) 1,785,469	—	1,538,033
	Total	47,478,600	3,323,502			
1967-68	Maha	29,952,300	2,096,661	Estimated		
	Yala	17,526,300	1,226,841	(As at 30.9.67) 3,323,502	—	—
	Total	47,478,600	3,323,502			
1968-69	Maha	39,783,545	2,784,848	Estimated		
	Yala	23,945,715	1,676,200	(As at 30.9.68) 3,323,502	—	1,137,546
	Total	63,729,260	4,461,048			
1969-70	Maha	39,783,545	2,784,848	Estimated		
	Yala	23,945,715	1,676,200	(As at 30.9.69) 4,461,048	—	—
	Total	63,729,260	4,461,048			

* *Estimated Drain on Fund :*

(*a*) Reduction on premium Subsidy (1964–65)	263,807
(*b*) Reduction on Contribution to Reserve (1964–65)	74,021
(*c*) Estimated losses over 8% liability (1965–66)	27,893
	365,721

Amount in Crop Insurance Fund—Actual amount will depend on Premium Receipts and Indemnity Payments during the year. It will vary from the Estimated amount in so far as Actual Receipts and Payments are different from the Estimated figures.

Total Insurance Liability=Estimated Area Sown X amount of Coverage (varying from Rs. 100 to Rs. 180 per acre).

Administrative Expenses

	Provisions in Estimates	*Estimated Provision*			
	1965–66	*1966–67*	*1967–68*	*1968–69*	*1969–70*
1. Salaries and Allowances	360,976	490,181	539,199	631,794	694,973
2. Travelling	55,000	70,000	70,000	85,000	85,000
3. Office furniture and office requisites	8,475	14,305	14,305	14,460	14,460
4. Overtime	3,000	3,500	3,500	4,000	4,000
5. Publicity	6,000	7,000	7,000	8,000	8,000
6. Expenses connected with the adjustment of losses and statistical survey	8,000	10,000	10,000	12,000	12,000
7. Expenses of the crop insurance board	1,000	1,000	1,000	1,000	1,000
8. Loss prevention	12,500	15,000	15,000	17,500	17,500
Total	454,951	610,986	660,004	773,754	836,933

Department of Agrarian Services,
336, Deans Road, Colombo 10.

REPORT ON THE CROP INSURANCE SCHEME

In examining proposals for expanding the volume of agricultural credit, we considered in brief the necessity to make certain adjustments in the Crop Insurance Scheme as it operates at present, in order to make it a more effective instrument for increased production. We stated there that the principal criticisms against the present Scheme arose from three considerations, viz. :

(*a*) the fact that the present scheme was based on a subsidy from the Government and therefore cannot be considered as an Insurance Scheme proper,

(*b*) the fact that in certain districts like Colombo and Kegalle, there was a fair degree of opposition to compulsory insurance and the collection of premia, and

(c) apart from indemnifying farmers in times of partial c complete crop failure, it offered no direct inducement t farmers to adopt improved methods of cultivation.

2. As regards the first consideration, we stated that we do no think that so far as peasant agriculture is concerned Crop Insuranc could be undertaken without some form of subsidy. That explain why no commercial firm anywhere in the world undertakes cro insurance, particularly, insurance of a cereal crop like rice. Th natural hazards are so great that the premia payable on a purely actuarial basis would attract no prospective clients. In low risk areas, farmers would not voluntarily take insurance cover, while in high risk areas, the premia would be too high to serve any practical purpose. Crop Insurance, therefore, has inevitably to be compulsory in nature to match the low-risk and high-risk areas, unless, of course, Government policy is to discourage farmers to cultivate in high-risk areas. Where, even after such matching, the premia payable was beyond the paying capacity of the average farmer, a Government subsidy was inevitable. In the circumstances prevailing in Ceylon, where the major rice producing districts also happen to be areas of high-risk, and the premia computed on an actuarial basis in these districts are too high to be of practical interest to farmers, the scheme has little chance of being self-supporting, even when the high-risk areas are matched with the low risk areas, due to the comparatively smaller extent of the latter.

3. The second objection was certainly correct and arose precisely because these districts were low-risk areas. Farmers in these districts were aware that they paid the same premia as farmers in high-risk areas. What they forgot however, was that they got a much higher coverage (viz. Rs. 170/- per acre in Kegalle as against Rs. 100/- in certain parts of Anuradhapura) for the same premium and even in these so called low-risk areas, the Department had in fact paid out indemnities for partial failure of crops. Considering however the mentality of the farmer, we considered that variable premium rates for low-risk and high-risk areas with a uniform coverage for all areas, would perhaps be more acceptable from his point of view. For example, if variable premia and uniform coverage were applicable, the Kegalle cultivator might perhaps pay Rs. 3/- per acre, while the Anuradhapura cultivator would pay Rs. 6/- for a uniform coverage of Rs. 100/- per acre in both districts. This was one respect in which we thought an amendment of the present scheme was possible and, in fact, desirable.

4. We stated that the 3rd objection was also substantially true. Under the present scheme, a farmer who adopts improved methods of cultivation was paid a coverage of 10% higher than the normal coverage without any extra premium charge. This extra coverage could however, hardly be considered as an adequate incentive to adopt such cultivation practices. We considered that at least a 50% increase in the normal coverage should be allowed, if insurance was to provide a positive inducement to increased production.

5. The impact of Crop Insurance on the economy of the country could be considered principally under three headlines, viz.:

(a) Its impact on production,

(b) Its socio-economic effects, and

(c) Its effect on the liability of the State in times of distress caused by crop failure.

6. From the point of view of production, Crop Insurance may be said to have beneficial effects, particularly, in high-risk areas, where farmers may, as a result on insurance, cultivate land which otherwise they would not have cultivated. Although no studies have so far been made to investigate how far Crop Insurance had contributed to such a situation in any district in which the scheme has been in operation for the last four years, we were informed that for the first time in Yala 1962, 58 acres of rain-fed paddy land in Anuradhapura district had been cultivated in the area under Crop Insurance. On the other hand, in areas of low-risk probability, non-cultivation of land due to fear of crop failure is seldom likely to take place. Again, by reason of the higher coverage provided for farmers who follow improved methods of cultivation, insurance may serve as an incentive for farmers to adopt improved (and to him, novel), cultivation practices in insured areas more readily than they would have done otherwise. But in this case, the provision of other institutional services, such as credit, seed, fertilizer, implements, etc. are likely to lead to the adoption of these cultivation practices more expeditiously than Crop Insurance itself. On the whole, therefore, we consider that Crop Insurance can by itself lead to increased production only by encouraging extensive cultivation in high-risk areas while it would prove a useful institutional device in both low-risk and high-risk areas to encourage and protect farmers who adopt improved cultivation practices. In this connection, we would strongly recommend that the Department undertakes studies in areas where insurance has been in operation to ascertain how far cultivators protected by insurance have either extended their cultivation or undertaken more intensive forms of cultivation as a result of the protection which they

received under the Insurance Scheme. Comparative studies in adjoining areas which were not so protected should also be made to investigate whether farmers in these areas had been handicapped by lack of insurance protection to make similar progress in their cultivation. If the results of such studies were available to us, we might have been able to make some considered recommendation regarding the usefulness of the Scheme so far as production is concerned. It is therefore very important that such studies should be made and the results made available before the scheme is extended beyond October 1964.

7. The impact of Crop Insurance on the socio-economic welfare of the farmers appears to us to be even a more important consideration. By guaranteeing farmers a minimum income even in times of crop failure, it stabilises farm incomes at a certain level, increases their credit-worthiness from the point of view of institutional credit, reduces the necessity of their having to incur " distress credit " from private money lenders and ensures the orderly continuation of cultivation even following a season of crop failure. In a predominantly agricultural country like Ceylon, these are vital considerations where stability in farm incomes, which necessarily means stability in their purchasing power, benefits the country as a whole and keeps up the general level of business and other economic activities even at times of large-scale crop failure.

8. Crop Insurance has also much to commend itself when viewed against the background of Government's liability in times of distress caused by crop failure. Under the present scheme, losses in any year up to 15% of the total insurance liability will be compensated by indemnities paid under the Insurance Scheme itself. It is only when losses are of a catastrophic nature and involve more than 15% of the total liability, will it be necessary for Government to provide funds to meet the cost of the indemnities payable. But even so, the necessity for normal relief measures so frequently undertaken in the past with its inevitable strain on the administrative machinery, would not arise as indemnity payments would now take their place. Apart from this saving to Government the payment of compensation, by way of insurance indemnity from funds collected with farmer participation, would certainly be more desirable than the disbursement of direct Government funds. We should mention, also that it would very rarely indeed that losses in any year will exceed 15% of the totol liability and as such, as a general rule, no direct Government expenditure under relief measures will become necessary, in any area where Crop Insurance is in operation.

9. In view of the considerations we have outlined in the preceding paragraphs, we are of opinion that Crop Insurance should be continued though with certain modifications to meet the criticisms we have mentioned in the earlier paragraphs. The present scheme is programmed to expand at the rate of 100,000 acres annually till 1964/65 so that by October 1964 a total of 300,000 acres will be under Insurance in the following areas :—

	District	*Acres*
1.	Colombo	14,100
2.	Kalutara	7,000
3.	Kandy	8,700
4.	Matale	3,000
5.	Nuwara Eliya	3,000
6.	Galle	10,900
7.	Matara	15,000
8.	Hambantota	44,500
9.	Jaffna	8,000
10.	Mannar	5,000
11.	Vavuniya	15,000
12.	Batticaloa	15,700
13.	Amparai	16,000
14.	Trincomalee	5,000
15.	Kurunegala	45,000
16.	Puttalam/Chilaw	5,000
17.	Anuradhapura	50,000
18.	Polonnaruwa	5,000
19.	Badulla	6,000
20.	Moneragala	3,000
21.	Ratnapura	8,700
22.	Kegalle	6,400
		300,000

By the end of 1964, the Scheme will be in operation in some part at least of every district in the Island and will include the entirety of Hambantota District and approximately 50,000 acres each of Kurunegala and Anuradhapura districts. A total of 13 D. R. O.'s divisions spread over 10 Revenue Districts will be fully covered. The area under insurance at every stage has been worked out on the basis of matching low-risk and high-risk areas with a view to keeping the Government premium subsidy free from wide fluctuations. The areas selected within each block of 100,000 acres are representative of the dry zone, intermediate zone and wet zone and are roughly proportionate to the sown area or asweddumized area in each such zone. Considering both the production and social service aspects of Crop Insurance, which we have explained in paragraphs 6 and 7 of this report, we are in general agreement with this programme of expansion. A cautious programme is definitely preferable in this case and the real impact of insurance on production can take place only when the other institutional services such as supply of credit, etc. have paved the way for a more general acceptance of modern cultivation practices. As long as these other services are not fully developed, the social service element of insurance would be the predominant factor in its favour.

10. In arriving at its recommendation, namely, that the area under insurance should not be expanded too rapidly, we have taken into consideration the further fact that, although Crop Insurance is in theory compulsory, it has been no easy matter to enforce the collection of premia in low-risk areas like Colombo and Kegalle and even in the irrigated area in Amparai District. The percentages of premium collected in the 6 districts where insurance was in operation during the last 4 years of the Scheme, when compared with the premiums due are as follows :—

Colombo District	1958–59	7·8%
	1959–60	6·6%
	1960–61	3·18%
	1961–62	10·09%
	Average for four years	6·8%
Hambantota District	1958–59	19·3%
	1959–60	16·1%
	1960–61	4·01%
	1961–62	41·23%
	Average for four years	20·9%
Batticaloa District	1958–59	7·23%
	1959–60	21·4%
	1960–61	30·94%
	1961–62	75·94%
	Average for four years	33·9%
Amparai District	1958–59	10·7%
	1959–60	1·5%
	1960–61	Nil
	1961–62	5·25%
	Average for four years	6·2%

Kegalle District	1958–59	10·04%	
	1959-60	7·5%	
	1960–61	3·05%	
	1961–62	7·64%	
Average for four years		6·7%	
Anuradhapura District	1958–59	57·3%	
	1959–60	129·2%	(over-recoveries)
	1960–61	99·93%	
	1961–62	174·5%	(over-recoveries)
Average for four years		107·5%	

11. It must of course be mentioned that during the first three years, i.e. from 1958/59-1960/61, the Scheme was worked entirely on an administrative basis and there was no legal liability or method of recovery available till 1961/62. We consider it a serious drawback that legislation which should have been enacted at least by 1959 was delayed till 1961 and insured cultivators who refused to pay premia got away with it with impunity for nearly three years. It will also be observed that except in the case of Anuradhapura district where premium recovery has been uniformly good, in all other districts recoveries have improved considerably in 1961/62.

12. While therefore, the position regarding premium recoveries has improved since the enactment of the Crop Insurance Act No. 13 of 1961, we consider that the reluctance of farmers in low-risk areas to pay their premia voluntarily and the inability of the Department to enforce recoveries, are factors that should not be overlooked. The reluctance to pay premia voluntarily is due to a number of reasons among which may be mentioned the novelty of the Scheme, the lack of conviction in its necessity and uniform premium rates in both high-risk and low-risk areas though backed with differential coverages. The difficulty of the Department to enforce recoveries was due. at least during the first three years primarily to the voluntary nature of the so-called 'compulsory scheme' and thereafter recovery being dependent almost exclusively on the G.P.S. In low-risk areas such as Colombo and Kegalle, where holdings are extremely small and high quality paddy is extensively grown, cultivators do not depend on the G. P. S. to sell their paddy and consequently compulsory recoveries through the G. P. S. is impossible. The only alternative left is to resort to Section 18 (*a*) of the Act, which enables the Department to sue cultivators in Courts to recover the premia as if "they were debts due to the Crown". Not only is this procedure cumbersome, but recovery by this method might well cost the Government more than the amount that is sought to be recovered. We would therefore recommend that Section 18 (*a*) of the Act be amended to provide for

recovery of overdue insurance premia in the same manner as the acreage levy under Section 55 of the amended Paddy Lands Act, i.e. by report to a Court of the fact of default and recovery by way of fine imposed by such Court.

13. In view of the low rate of premium collections up to date and the necessity to match low-risk and high-risk areas at every stage of expansion, we consider it prudent from the point of view of Government not to expand the Scheme too rapidly, at least until such time as farmer resistance in low-risk areas is overcome. The scheme might otherwise well become another form of subsidy whereby the Government is committed to an annual payment of premium subsidy and an obligation to indemnify cultivators for crop failure without a corresponding obligation on farmers to pay their own share of contribution to the premium fund. In our opinion, the extension of the scheme beyond the 300,000 acres referred to in paragraph 9 should be undertaken only if and when a reasonable percentage of the premium due is in fact collected from the insureds. We recommend below certain measure which we consider would help to make the scheme more attractive than at present from the point of view of cultivators and would so lead to a more willing acceptance of their obligations in both high-risk and low-risk areas.

14. We consider that the present scheme, which provides for a uniform premium rate throughout the country and the variable indemnities in different areas depending on the risk involved in each areas, should be replaced by a system whereby the indemnity payable in all areas is the same, while the premium rate is adjusted in different areas on the basis of risks. This would mean that in low-risk areas the premium payable would be low when compared to premium payable in high-risk areas for the same indemnity. A compulsory insurance cover of Rs. 100 per acre could be offered in all districts at premium rates varying from Rs. 3 to Rs. 6 per acre according to the risk involved in each district at a total cost of approximately Rs. 685,000 to the Government by way of premium subsidy made up as follows :—

	Maha	*Yala*
Total sown area	Acres 958,338	Acres 577,310
Percentage of loss	6·4%	4·4%
Area of Crop loss	Acres 61,520	Acres 25,153
Indemnity at Rs. 100 per acre	Rs. 6,152,000	Rs. 2,515,300
Premium receipts	Rs. 5,039,223	Rs. 2,943,959
Difference between indemnities and premium receipts	—Rs. 1,112,777	+Rs. 428,659

The relevant acturial tables indicating detailed information per districts is given in Annexure A.

15. We recommend further that a 50 per cent. increase in coverage (i. e. Rs. 150 per acre) should be allowed to farmers who adopt improved methods of cultivation at no extra premium charge under this Compulsory Insurance Scheme. For purposes of estimation, we have assumed that half the extent sown in Maha and Yala will be under improved cultivation practices. Applying the same percentages of loss per district as indicated in Annexure A, indemnities payable at this higher rate of coverage, premium receipts and the Government subsidy required would be as follows :—

		Maha		*Yala*
Extent under improved cultivation	Acres	479,167	Acres	288,658
Estimated failure	„	30,761	„	12,576
Indemnity payable	Rs.	4,614,150	Rs.	1,886,400
Premium receipts	„	2,519,648	„	1,471,997
Government subsidy required	„	2,094,502	+Rs.	414,403
Total Subsidy	Rs.	2,508,905		

16. When half the acreage is under improved cultivation practices and entitled to a higher coverage of Rs. 150 per acre, only the remaining half will receive indeminities at Rs. 100 per acre. The total cost to the Government of the Scheme recommended by us in Paragraphs 14 and 15 will therefore be as follows :—

	Rs.
Half Subsidy required for Scheme in Paragraph 14	342,059
Subsidy required for Scheme in Paragraph 15	2,508,905
Total	2,850,964

17. We also recommend that, in addition to the compulsory scheme outlined in Paragraphs 14 and 15, an optional scheme providing for higher coverages and an increased premium be also provided to farmers who wish to take insurance protection over and above the compulsory scheme. This optional scheme, in our opinion, will provide the maximum incentives to farmers to undertake cultivation in circumstances in which they would not have done otherwise and to adopt improved cultivation methods with the fullest realisation that their investment will be well repaid. Under this scheme, indemnity payable for normal cultivation would be Rs. 150 per acre, while the indemnity payable for improved methods of cultivation would be as high as Rs. 250 per acre. Whereas premium rates under the compulsory scheme vary from Rs. 3 to Rs. 6 per acre, premium

rates under the optional scheme vary from Rs. 4 to Rs. 12 per acre. Under both schemes, premia in high-risk areas ars subsidised, while premia in low-risk areas are slightly more than what should be charged on an actuarial basis. Annexure C indicate the coverages and premia under both schemes, while Annexures D and C contain actuarial tables for the optional scheme. The optional scheme will naturally be preferred by farmers in high-risk areas, but premium rates in low-risk areas are sufficiently attractive for farmers even in these areas to take the optional cover in lieu of the compulsory. The following example will make this clear :—

Example

> A farmer in Kegalle will get Rs. 100 as indemnity for normal cultivation and Rs. 150 for improved methods of cultivation for a premium of Rs. 3 under the compulsory scheme. Under the optional scheme, he will pay Rs. 4 as premium for an indemnity of Rs. 150 for normal farming methods and Rs. 5 as premium for an indemnity of Rs. 250 for special farming practices. A cultivator in Kegalle practising improved methods of cultivation is therefore likely to prefer paying a premium of Rs. 5 for an indemnity of Rs. 250 rather than take cover under the compulsory scheme.

To the extent that farmers in low-risk areas take optional cover, the net cost to the Government of the Scheme will be reduced as shown in the actuarial tables in Annexures D and E. If all farmers at some stage will take optional cover, payment of indemnity at Rs. 150 per acre (i.e. for normal cultivation) will result in a net profit of Rs. 364,499 as indicated in Annexure D. On the other hand, if only farmers in high-risk areas take the optional cover, the Government subsidy will amount to Rs. 1,265,164. If half the area is under special farming and all cultivators pay the optional cover, the Government subsidy will amount to Rs. 3,017,998 made up as follows :—

	Rs.	
Half area under normal practices—		
Maha Season — Loss	202,248	(Annexure D)
Yala season — Profit	384,497	„
Half area under special farming—		
Maha Season — Loss	2,735,489	(Annexure E)
Yala Season — Loss	464,758	„
Total Loss (Government Subsidy) ..	3,017,998	

18. On the other hand, if only farmers in high-risk areas take the optional cover and half the extent in these areas are under special farming practices, the Government subsidy would amount to Rs. 4,178,098 made up as follows :—

		Rs.	
Half area in high risk areas under normal practices—			
Maha Season — Loss	.. ..	584,774	(Annexure D)
Yala Season — Loss	.. ..	47,808	"
Half the area in high risk area under special farming practices—			
Maha Season — Loss	.. ..	2,859,066	(Annexure E)
Yala Season — Loss	.. ..	686,450	"
Total Loss (Government Subsidy)	..	4,178,098	

19. The maximum Government subsidy under all the schemes recommended by us is therefore not likely to exceed Rs. 5 million an year when crop insurance covers the entirety of the paddy area in Ceylon.

20. Finally, we recommend that in all areas under insurance cover, the insured cultivators be provided with a free plant protection service against pests and diseases. This would not only provide a tangible benefit to cultivators, particularly in low-risk areas who may not in normal circumstances be entitled to any indemnities, but will also serve to limit insurance liability. We understand that the plant protection service of the Department of Agriculture comes into action at present, only when pests and diseases occur on an epidemic scale. Under the proposal made by us, this service will be available as soon as such pest attacks and diseases are likely to take place on any scale whatsoever. We consider that the Plant Protection Branch of the Department of Agriculture should be equipped to perform these services on behalf of the Crop Insurance Division of the Agrarian Services Department.

21. We give below a summary of the recommendations made by us in this report :

Serial No.	*Recommendations*	*Reference Para*
1 ..	The Crop Insurance Division of the Department of Agrarian Services should undertake studies in areas where insurance has been in operation to ascertain what benefits have accrued, so far as production is concerned, in areas which have been under insurance for the last four years and compare the results of such studies with production statistics in similar areas but which did not enjoy the benefit of crop insurance.	6

Serial No.	*Recommendations*	*Reference Para*
2 ..	The Scheme should be expanded as programmed at present at the rate of 100,000 acres per year, until a total of 300,000 acres are covered by October, 1964. We do not recommend a more rapid expansion of the Scheme due to reasons explained in the text.	9 & 10
3 ..	Further extension of the Scheme beyond 300,000 acres should be considered— (*a*) on the basis of studies regarding the effect of Crop Insurance on production, and (*b*) the percentage of actual premium collections in insured areas	6 & 13
4 ..	Section 18 (*a*) of the Crop Insurance Act No. 13 of 1961 should be amended to provide for the recovery of overdue insurance premia in the same manner as the acreage levy under Section 36 of the Paddy Lands Act is sought to be recovered under Section 55 of the amended Paddy Lands Act.	12
5 ..	The present Compulsory Insurance Scheme which provides for a uniform premium rate with variable indemnities in different areas, should be replaced with a scheme providing for a fixed indemnity in all districts and variable premium rates in each area according to the risk involved. A 50 per cent. increase in coverage should be allowed to farmers who adopt improved methods at no extra premium to be charged under this compulsory scheme.	14 & 15
6 ..	In addition to the compulsory scheme, an optional scheme should be made available with substantially higher coverages and increased premium rates as this would provide the maximum inducement possible for increased production. Under the optional scheme as well, a higher coverage should be offered to those who adopt improved methods of cultivation.	20
7 ..	All insured cultivators should be provided with a free plant protection service against pests and diseases and the Plant Protection Branch of the Department of Agriculture should be equipped to perform this service on behalf of the Crop Insurance Division of the Department of Agrarian Services.	20

(Sgd.) J. V. FONSEKA, Esqr.,
Commissioner of Agrarian
Services,
Chairman.

(Sgd.) Dr. P. C. BANSIL,
Planning Department.

(Sgd.) H. S. WANASINGHE, Esqr.,
Commissioner of Co-operative
Development.

ACTUARIAL TABLE—COMPULSORY INSURANCE, MINIMUM COVERAGE

District	MAHA SEASON							YALA SEASON						
	Area Sown (Maha) *(Acres)*	*Crop Loss Probability* (%)	*Estimated area Falling* *(Acres)*	*Indemnity payable @ Rs. 100 per acre* *(Rs.)*	*Computed premium per acre* *(Rs.)*	*Premium to be charged* *(Rs.)*	*Premium Receipts* *(Rs.)*	*Area Sown (Yala)* *(Acres)*	*Crop Loss Probability* (%)	*Estimated Area Falling* *(Acres)*	*Indemnity payable @ Rs. 100* *(Rs.)*	*Computed Premium Per Acre* *(Rs.)*	*Premium to be Charges* *(Rs.)*	*Premium Receipts* *(Rs.)*
1. Colombo ..	53,388	3·1	1,648	164,800	3·09	4·00	213,552	22,252	3·6	790	79,000	3·55	4·00	89,008
2. Kalutara ..	35,709	5·3	1,900	190,000	5·32	6·00	214,254	36,172	5·6	2,036	203,600	5·63	6·00	217,032
3. Kandy ..	43,525	1·8	797	79,700	1·83	3·00	130,575	33,256	2·7	909	90,900	2·73	3·00	99,768
4. Matale ..	21,372	3·9	837	83,700	3·92	5·00	106,860	14,850	2·6	391	39,100	2·63	5·00	74,250
5. N'Eliya ..	16,256	0·7	115	11,500	·71	3·00	48,768	7,992	1·8	144	14,400	1·80	3·00	23,976
6. Galle ..	38,468	2·7	1,042	104,200	2·71	4·00	153,872	42,544	4·2	1,791	179,100	4·21	4·00	170,176
7. Matara ..	40,090	3·9	1,548	154,800	3·86	5·00	200,450	40,684	5·2	2,118	211,800	5·20	5·00	203,420
8. Hambantota ..	37,939	2·8	1,064	106,400	2·81	4·00	151,756	35,450	4·2	1,506	150,600	4·24	4·00	141,800
9. Jaffna ..	67,449	8·7	5,847	584,700	8·67	6·00	404,604	10,614	3·2	340	34,000	3·20	6·00	63,684
10. Mannar ..	29,733	8·3	2,476	247,600	8·33	6·00	178,398	4,603	3·5	161	16,100	3·50	6·00	27,618
11. Vavuniya ..	46,615	3·7	1,710	171,000	3·67	5·00	233,075	8,395	5·9	495	49,500	5·90	5·00	41,975
12. Batticaloa ..	57,017	12·2	6,933	693,300	12·16	6·00	342,102	20,158	3·6	728	72,800	3·61	6·00	120,948
13. Amparai ..	64,807	10·5	6,822	682,200	10·53	6·00	388,842	50,887	3·9	1,975	197,500	3·88	6·00	305,322
14. Trincomalee ..	35,688	9·3	3,300	330,000	9·25	6·00	214,128	21,071	2·0	424	42,400	2·01	6·00	126,426
15. Kurunegala ..	138,425	6·9	9,558	955,800	6·91	6·00	830,550	64,185	6·6	4,245	424,500	6·61	6·00	385,110
16. Puttalam-Chilaw ..	23,228	12·3	2,859	285,900	12·31	6·00	139,368	5,599	7·1	396	39,600	7·07	6·00	33,594
17. Anuradhapura ..	84,349	10·1	8,535	853,500	10·12	6·00	506,094	49,007	9·3	4,558	455,800	9·30	6·00	294,042
18. Polonnaruwa ..	46,006	5·2	2,386	238,600	5·19	6·00	276,036	41,353	1·5	618	61,800	1·49	6·00	248,118
19. Badulla ..	11,640	4·9	575	57,500	4·94	6·00	69,840	21,799	2·5	544	54,400	2·50	6·00	130,794
20. Monaragala ..	12,069	6·4	771	77,100	6·39	6·00	72,414	2,527	4·0	101	10,100	4·00	6·00	15,162
21. Ratnapura ..	27,046	1·9	513	51,300	1·90	3·00	81,138	23,787	2·6	626	62,600	2·63	3·00	71,361
22. Kegalle .	27,519	1·0	284	28,400	1·03	3·00	82,557	20,125	1·3	257	25,700	1·28	3·00	60,375
Total	958,338	—	61,520	6,152,000	—	—	3,039,223	577,310	—	25,153	2,515,300	—	—	2,943,959
Average	—	6·4	—	—	6·42	—	—	—	4·4	—	—	4·36	—	—
Surplus or Deficit							- 1,112,777							+ 428,659

ACTUARIAL TABLE—COMPULSORY INSURANCE : SPECIAL FARMING COVERAGE

ANNEXURE B

District	MAHA SEASON						YALA SEASON					
	Area Sown (Acres)	Estimated Area Failing (Acres)	Indemnity Payable @ Rs. 150 Per acre (Rs.)	Computed Premium Per Acre (Rs.)	Premium to be Charged (Rs.)	Premium Receipts (Rs.)	Area Sown (Acres)	Estimated Area Failing (Acres)	Indemnity Payable @ Rs. 150 Per Acre (Rs.)	Computed Premium Per Acre (Rs.)	Premium to be Charged (Rs.)	Premium Receipt (Rs.)
1. Colombo	26,694	824	123,600	4·63	4·00	106,776	11,126	395	59,250	5·33	4·00	44,504
2. Kalutara	17,854	950	142,500	7·98	6·00	107,124	18,086	1,018	152,700	8·44	6·00	108,516
3. Kandy	21,762	398	59,700	2·74	3·00	65,286	16,628	454	68,100	4·10	3·00	49,884
4. Matale	10,686	418	62,700	5·87	5·00	53,430	7,425	196	29,400	3·96	5·00	37,125
5. N Eliya	8,128	58	8,700	1·07	3·00	24,384	3,996	72	10,800	2·70	3·00	11,988
6. Galle	19,234	521	78,150	4·06	4·00	75,936	21,272	896	134,400	6·32	4·00	85,088
7. Matara	20,045	774	116,100	5·79	5·00	100,225	20,342	1,059	158,850	7·81	5·00	101,710
8. Hambantota ..	18,970	532	79,800	4·21	4·00	75,880	17,725	753	112,950	6·37	4·00	70,900
9. Jaffna	33,724	2,924	438,600	13·00	6·00	202,344	5,307	170	25,500	4·81	6·00	31,842
10. Mannar	14,866	1,238	185,700	12·49	6·00	89,196	2,302	80	12,000	5·22	6·00	13,812
11. Vavuniya	23,308	855	128,250	5·50	5·00	116,540	4,198	248	37,200	8.86	5·00	20,990
12. Batticaloa	28,508	3,466	519,900	18·24	6·00	171,048	10,079	364	54,600	5·42	6·00	60,474
13. Amparai	32,404	3,411	511,650	15·79	6·00	194,424	23,444	988	148,200	5·83	6·00	152,664
14. Trincomalee ..	17,844	1,650	247,500	13·87	6·00	107,064	10,536	212	31,800	3·02	6·00	63,216
15. Kurunegala ..	69,212	4,779	716,850	10·36	6·00	415,272	32,092	2,122	318,300	9·92	6·00	192,552
16. Puttalam-Chilaw ..	11,614	1,430	214,500	18·47	6·00	69,684	2,800	198	29,700	10·61	6·00	16,800
17. Anuradhapura ..	42,174	4,268	640,200	15·18	6·00	253,044	24,504	2,279	341,850	13·95	6·00	147,024
18. Polonnaruwa ..	23,003	1,193	178,950	7·78	6·00	138,018	20,676	309	46,350	2·24	6·00	124,056
19. Badulla .. .	5,820	288	43,200	7·42	6·00	34,920	10,900	272	40,800	3·74	6·00	65,400
20. Monaragala ..	6,034	386	57,900	9·60	6·00	36,204	1,264	50	7,500	5·93	6·00	7,584
21. Ratnapura ..	13,523	256	38,400	2·84	3·00	40,569	11,894	313	46,950	3·95	3·00	35,682
22. Kegalle	13,760	142	21,300	1·55	3·00	41,260	10,062	128	19,200	1·91	3·00	30,186
Total .	479,167	30,761	4,614,150	—	—	2,519,648	288,658	12,576	1,886,400	—	—	1,471,997
Average ..	—	—	—	9·63	—	—	—	—	—	6·54	—	—
Surplus or Deficit						-2,094,502						-414,403

ACTUARIAL TABLE—OPTIONAL INSURANCE, MINIMUM COVERAGE

ANNEXURE D

District	MAHA SEASON						YALA SEASON					
	Area Sown (Acres)	Estimated Area Failing (Acres)	Indemnity Payable @ Rs. 150 Per Acre (Rs.)	Computed Premium Per Acre (Rs.)	Premium to be Charged (Rs.)	Premium Receipts (Rs.)	Area Sown (Acres)	Estimated Area Failing (Acres)	Indemnity Payable @ Rs. 150 Per Acre (Rs.)	Computed Premium Per Acre (Rs.)	Premium to be Charged (Rs.)	Premium Receipts (Rs.)
1. Colombo	53,388	1,648	247,200	4·63	6·00	320,328	22,252	790	118,500	5·33	6·00	133,512
2. Kalutara	35,709	1,900	285,000	7·98	9·00	321,381	36,172	2,036	305,400	8·44	9·00	325,548
3. Kandy	43,525	797	119,550	2·75	4·00	174,100	33,256	909	136,350	4·10	5·00	166,280
4. Matale	21,372	837	125,550	5·88	7·00	149,604	14,850	391	58,650	3·95	7·00	103,950
5. N'Eliya	16,256	115	17,250	1·06	4·00	65,024	7,992	144	21,600	2·70	4·00	31,968
6. Galle	38,468	1,042	156,300	4·06	6·00	230,808	42,544	1,791	268,650	6·32	7·00	297,808
7. Matara	40,090	1,548	232,200	5·79	7·00	280,630	40,684	2,118	317,700	7·81	8·00	325,472
8. Hambantota ..	37,939	1,064	159,600	4·21	6·00	227,634	35,450	1,506	225,900	6·38	7·00	248,150
9. Jaffna	67,449	5,847	877,050	13·00	12·00	809,388*	10,614	340	51,000	4·81	8·00	84,912
10. Mannar	29,733	2,476	371,400	12·49	12·00	356,796*	4,603	161	24,150	5·25	8·00	36,824
11. Vavuniya	46,615	1,710	256,500	5·50	7·00	326,305	8,395	495	74,250	8·85	9·00	75,555
12. Batticaloa	57,017	6,933	1,039,950	18·24	12·00	684,204*	20,158	728	109,200	5·42	8·00	161,264
13. Amparai	64,807	6,822	1,023,300	15·79	12·00	777,684	50,887	1,975	296,250	5·82	8·00	407,096
14. Trincomalee ..	35,688	3,300	495,000	13·89	12·00	428,256*	21,071	424	63,600	3·02	8·00	168,568
15. Kurunegala ..	138,425	9,558	1,433,700	10·36	11·00	1,522,675	64,185	4,245	636,750	9·92	10·00	641,850
16. Puttalam-Chilaw ..	23,228	2,859	428,850	18·46	12·00	278,736*	5,599	396	59,400	10·61	11·00	61,589
17. A'Pura	84,349	8,535	1,280,250	15·18	12·00	1,012,188*	49,007	4,558	683,700	13·94	12·00	588,084*
18. Polonnaruwa ..	46,006	2,386	357,900	7·78	9·00	414,054	41,353	618	92,700	2·24	7·00	289,471
19. Badulla	11,640	575	86,250	7·41	9·00	104,760	21,799	544	81,600	3·74	8·00	174,392
20. Monaragala ..	12,069	771	115,650	9·58	10.00	120,690	2,527	101	15,150	5·94	8·00	20,216
21. Ratnapura ..	27,046	513	76,950	2·85	4·00	108,184	23,787	626	93,900	3·95	5·00	118,935
22. Kegalle	27,519	284	42,600	1·55	4·00	110,076	20,125	257	38,550	1·92	4·00	80,500
Total ..	958,338	61,520	9,228,000	—	—	8,823,505	577,310	25,153	3,772,950	—	—	4,541,944
Average ..	—	—	—	9·63	—	—	—	—	—	6·54	—	—
Surplus or Deficit						- 404,495 - 1,169,548 (in high risk areas only*)						+ 768,994 - 95,616 (in high risk areas only*)

ACTUARIAL TABLE—OPTIONAL INSURANCE, SPECIAL FARMING COVERAGE

District	*MAHA SEASON*						*YALA SEASON*					
	Area Sown (*Acres*)	*Estimated Area Failing* (*Acres*)	*Indemnity Payable @ Rs. 250 Per Acre* (*Rs.*)	*Computed Premium Per Acre* (*Rs.*)	*Premium to be Charged* (*Rs.*)	*Premium Receipts* (*Rs.*)	*Area Sown* (*Acres*)	*Estimated Area Failing* (*Acres*)	*Indemnity Payable @ Rs. 250 Per Acre* (*Rs.*)	*Computed Premium Per Acre* (*Rs.*)	*Premium to be Charged* (*Rs.*)	*Premium Receipts* (*Rs.*)
1. Colombo	26,694	824	206,000	7·72	8·00	213,552	11,126	395	98,750	8·88	8·00	89,008*
2. Kalutara	17,854	950	237,500	13·30	12·00	214,248*	18,086	1,018	254,500	14·07	12·00	217,032*
3. Kandy	21,762	398	99,500	4·57	5·00	108,810	16,628	454	113,500	6·83	6·00	99,768*
4. Matale	10,686	418	104,500	9·78	10·00	106,860	7,425	196	49,000	6·60	8·00	59,400
5. N'Eliya	8,128	58	14,500	1·78	4·00	32,512	3,996	72	18,000	4·51	5·00	19,980
6. Galle	10,234	521	130,250	6·77	7·00	134,638	21,272	896	224,000	10·53	8·00	170,176*
7. Matara	20,045	774	193,500	9·65	10·00	200,450	20,342	1,059	264,750	13·01	10·00	203,420*
8. Hambantota ..	18,970	532	133,000	7·01	8·00	151,760	17,725	753	188,250	10·62	8·00	141,800*
9. Jaffna	33,724	2,924	731,000	21·68	12·00	404,688*	5,307	170	42,500	8·01	10·00	53,070
10. Mannar	14,866	1,238	309,500	20·82	12·00	178,392*	2,302	80	20,000	8·69	10·00	23,020
11. Vavuniya	23,308	855	213,750	9·17	10·00	233,080	4,198	248	62,000	14·77	10·00	41,980*
12. Batticaloa	28,508	3,466	866,500	30·40	12·00	342,096*	10,079	364	91,000	9·03	10·00	100,790
13. Amparai	32,404	3,411	852,750	26·32	12.00	388,848*	25,444	988	247,000	9·71	10·00	254,440
14. Trincomalee ..	17,844	1,650	412,500	23·12	12·00	214,128*	10,536	212	53,000	5·03	9·00	94,824
15. Kurunegala ..	69,212	4,779	1,194,750	17·26	12·00	830,544*	32,092	2,122	530,500	16·53	12·00	385,104*
16. Puttalam–Chilaw ..	11,614	1,430	357,500	30·78	12·00	139,368*	2,800	198	49,500	17·68	12·00	33,600*
17. Anuradhapura ..	42,174	4,268	1,067,000	25·30	12·00	506,088*	24,504	2,279	569,750	23·25	12·00	294,048*
18. Polonnaruwa ..	23,003	1,193	298,250	12·97	12·00	276,036*	20,676	309	77,250	3·74	8·00	165,408
19. Badulla	5,820	288	72,000	12·37	12·00	69,840*	10,900	272	68,000	6·24	9·00	98,100
20. Monaragala ..	6,034	386	96,500	15·99	12·00	72,408*	1,264	50	12,500	9·89	10·00	12,640
21. Ratnapura ..	13,523	256	64,000	4·73	5·00	67,615	11,894	313	78,250	6·58	6·00	71,364*
22. Kegalle	13,760	142	35,500	2·58	5·00	68,800	10,062	128	32,000	3·18	5·00	50,310
Total ..	479,167	30,761	7,690,250	—	—	4,954,761	288,658	12,576	3,144,000	—	—	2,679,242
Average ..	—	—	—	16·05	—	—	—	—	—	10·89	—	—
Surplus or Deficit						– 2,735,489 – 2,859,066 (in high risk areas only*)						+ 464,758 – 686,450 (in high risk areasonly*)

<table>
<tr><th rowspan="3">District</th><th colspan="4"><i>MINIMUM COMPULSORY COVERAGES</i></th><th colspan="4"><i>OPTIONAL HIGHER COVERAGES</i></th></tr>
<tr><th colspan="2"><i>Normal Farming Practices (Rs. 100 per acre)</i></th><th colspan="2"><i>Special Farming Practices (Rs. 150 per acre)</i></th><th colspan="2"><i>Normal Farming Practices (Rs. 150 per acre)</i></th><th colspan="2"><i>Special Farming Practices (Rs. 250 per acre)</i></th></tr>
<tr><th><i>MAHA</i></th><th><i>YALA</i></th><th><i>MAHA</i></th><th><i>YALA</i></th><th><i>MAHA</i></th><th><i>YALA</i></th><th><i>MAHA</i></th><th><i>YALA</i></th></tr>
<tr><td>1. Colombo</td><td colspan="4">4·00</td><td>6·00</td><td>6·00</td><td>8·00</td><td>8·00</td></tr>
<tr><td>2. Kalutara</td><td colspan="4">6·00</td><td>9·00</td><td>9·00</td><td>12·00</td><td>12·00</td></tr>
<tr><td>3. Kandy</td><td colspan="4">3·00</td><td>4·00</td><td>5·00</td><td>5·00</td><td>6·00</td></tr>
<tr><td>4. Matale</td><td colspan="4">5·00</td><td>7·00</td><td>7·00</td><td>10·00</td><td>8·00</td></tr>
<tr><td>5. Nuwara-Eliya</td><td colspan="4">3·00</td><td>4·00</td><td>4·00</td><td>4·00</td><td>5·00</td></tr>
<tr><td>6. Galle</td><td colspan="4">4·00</td><td>6·00</td><td>7·00</td><td>7·00</td><td>8·00</td></tr>
<tr><td>7. Matara</td><td colspan="4">5·00</td><td>7·00</td><td>8·00</td><td>10·00</td><td>10·00</td></tr>
<tr><td>8. Hambantota</td><td colspan="4">4·00</td><td>6·00</td><td>7·00</td><td>8·00</td><td>8·00</td></tr>
<tr><td>9. Jaffna</td><td colspan="4">6·00</td><td>12·00</td><td>8·00</td><td>12·00</td><td>10·00</td></tr>
<tr><td>10. Mannar</td><td colspan="4">6·00</td><td>12·00</td><td>8·00</td><td>12·00</td><td>10·00</td></tr>
<tr><td>11. Vavuniya</td><td colspan="4">5·00</td><td>7·00</td><td>9·00</td><td>10·00</td><td>10·00</td></tr>
<tr><td>12. Batticaloa</td><td colspan="4">6·00</td><td>12·00</td><td>8·00</td><td>12·00</td><td>10·00</td></tr>
<tr><td>13. Amparai</td><td colspan="4">6·00</td><td>12·00</td><td>8·00</td><td>12·00</td><td>10·00</td></tr>
<tr><td>14. Trincomalee</td><td colspan="4">6·00</td><td>12·00</td><td>8·00</td><td>12·00</td><td>9·00</td></tr>
<tr><td>15. Kurunegala</td><td colspan="4">6·00</td><td>11·00</td><td>10·00</td><td>12·00</td><td>12·00</td></tr>
<tr><td>16. Puttalam-Chilaw</td><td colspan="4">6·00</td><td>12·00</td><td>11·00</td><td>12·00</td><td>12·00</td></tr>
<tr><td>17. Anuradhapura</td><td colspan="4">6·00</td><td>12·00</td><td>12·00</td><td>12·00</td><td>12·00</td></tr>
<tr><td>18. Polonnaruwa</td><td colspan="4">6·00</td><td>9·00</td><td>7·00</td><td>12·00</td><td>8·00</td></tr>
<tr><td>19. Badulla</td><td colspan="4">6·00</td><td>9·00</td><td>8·00</td><td>12·00</td><td>9·00</td></tr>
<tr><td>20. Moñaragala</td><td colspan="4">6·00</td><td>10·00</td><td>8·00</td><td>12·00</td><td>10·00</td></tr>
<tr><td>21. Ratnapura</td><td colspan="4">3·00</td><td>4·00</td><td>5·00</td><td>5·00</td><td>6·00</td></tr>
<tr><td>22. Kegalle</td><td colspan="4">3·00</td><td>4·00</td><td>4·00</td><td>5·00</td><td>5·00</td></tr>
</table>

A Three-Year Programme to Increase the Cropped Area under Paddy by 100,000 Acres

A THREE-YEAR PROGRAMME TO INCREASE THE CROPPED AREA UNDER PADDY BY 100,000 ACRES

A—The Problem

THE total area available for paddy cultivation in Ceylon in 1964 has been estimated at 1,249,156 acres. The actual extent cultivated in Maha 1963/64 and Yala 1964 and the area left uncultivated during these 2 seasons are as follows:—

	Acreage cultivated	*Acreage uncultivated*
Maha 1963-64	1,013,611	235,545
Yala 1964	571,587	677,569
Total	1,585,198	913,114

The location of both cultivated and uncultivated lands, district-wise, is shown in Table I. It will be observed that in this table, the 22 districts have been classified into 4 groups. The 10 districts included in the 'Dry Zone' contains slightly more than half the total paddy area in Ceylon. 4 districts have been classified under 'Dry cum Wet Zone', as they fall partly in the 'Dry Zone' and partly in the 'Wet Zone'. The remaining 8 districts are almost entirely in the 'Wet Zone' and have been classified into 2 groups—'Wet Zone' and 'Mid Zone'.

2. From the point of view of irrigation facilities available for cultivation, the total paddy area of 1.249 million acres could be divided as follows:—

	Acreage	*Percentage to total area*
Area under major works	365,949	29 per cent.
Area under minor works	370,411	30 "
Area rain-fed	512,796	41 "
Total	1,249,156	100 "

Tables II, III and IV indicate the location of the cultivated and uncultivated lands, district-wise, according to the above classification based on the availability of irrigation facilities.

3. From a study of the figures given in these 4 tables, it is possible to determine, in a broad way—

(*a*) what extent of the area that is now uncultivated is in fact not cultivable due to serious physical limitations, the removal of which would necessitate large capital expenditure; and

(*b*) the balance area of the uncultivated acreage which could be rendered cultivable by a solution of the difficulties which now present their cultivation.

4. It will be seen from Table I that the total extent of land uncultivated during Yala 1964 was 677,569 acres. From Tables II, III and IV, it is possible to break up this extent zone-wise and according to the availability of irrigation facilities as follows:—

	Dry Zone	*Dry cum Wet Zone*	*Wet Zone*	*Mid Zone*
Under major works	115,521	12,022	10,033	2,165
Under minor works	122,120	81,424	10,100	15,018
Rain-fed	198,777	48,772	55,192	8,425
	436,418	142,218	75,325	25,608
	578,636		98,933	

5. It would appear from the above analysis that as much as 578,000 acres of the uncultivated area in Yala lie in the Dry and Dry cum Wet Zones. Considering the rainfall during Yala, which is between 0 to 20 inches from May to September, there appears to be very little prospect of rendering cultivable a large proportion of this area during this season. In the first place, the uncultivated area that is rain-fed, which amounts to 250,000 acres, would seem to be definitely impossible of cultivation during Yala unless water from the Wet Zone could be diverted to these districts. Secondly, the bulk of the uncultivated area that is under minor works amounting to approximately 200,000 acres would also seem to be uncultivable during Yala as the rainfall is inadequate to feed these works and losses due to evaporation during supply, domestic needs, etc., would be considerable. The best chances of extending the area under cultivation during Yala in the Dry Zone would naturally be under the major works, although here too, due allowance has to be made for general drought conditions in the area and the inability of most reservoirs replenish their stored water during this season. Nevertheless, on a very conservative estimate, it would appear to be reasonably certain that at least half the area that is now uncultivated under major works during Yala, i.e., say about 60,000 acres, could be rendered

cultivable by the elimination of those factors which now prevent the cultivation of these lands. One such factor is particularly worthy of mention, namely, the persistant habit of cultivators in the Dry Zone to delay the commencement of the Maha cultivation until they have completed work on their chenas. This practice results in the non-utilization of the initial North-East Monsoon rains, and the consequent consumption of irrigation water to mature the Maha Crop which could otherwise be utilized for the cultivation of a larger extent during Yala.

6. In the Wet Zone and Mid Zone, it would be observed that the area left uncultivated in Yala is approximately 100,000 acres. This is the period of the South-West Monsoon when the rainfall is within the range of 40 to over 120 inches, and the principal limiting factor is excess water and flooding. The provision of drainage facilities will render a large part of this acreage cultivable, but this work is likely to involve considerable expenditure and a fair period of time for investigation and designs. It should also be remembered that a part of this area is below sea-level and there is also the partiality of certain cultivators in this region to grow long-aged varieties of paddy which are better capable of resisting unexpected rain and moderate flooding. When due allowance is made for all these factors and on the assumption that the uncultivated acreage that is rain-fed and about half the uncultivated area under minor works would be the most vulnerable to heavy floods, it would appear reasonable to assume that approximately 25,000 acres out of the uncultivated acreage in the Wet Zone during Yala could be rendered cultivable by a solution of the institutional problems that now prevent the cultivation of these lands. On the other hand, if action can also be taken to control floods in this area, the cultivated acreage could well be increased up to at least 60,000 acres.

7. Similarly, the area uncultivated in the Maha Season, which is approximately 235,000 acres, could be distributed as follows from the point of irrigation facilities and climatic zones :—

	Dry Zone	*Dry cum Wet Zone*	*Wet Zone*	*Mid Zone*
Under major schemes ..	65,165 ..	2,211 ..	8,214 ..	206
Under minor schemes ..	53,297 ..	23,476 ..	9,500 ..	1,423
Rain-fed areas ..	31,692 ..	4,890 ..	35,087 ..	384
	150,154	30,577	52,801	2,013

8. It would be seen from the above classification that approximately 180,000 acres of the area uncultivated in Maha lies in the Dry Zone, which has adequate rainfall during this period to sustain a crop. It is significant that more than one-third of this uncultivated acreage is located under major irrigation works, while 3 districts, Amparai, Batticaloa and Hambantota, alone account for as much as 45,000 acres of uncultivated land under major works. Here too, as in the Wet Zone during Yala, certain areas experience floods due to heavy discharge from rivers, for instance, in Allai area where flood control measures might be prohibitive in cost. When due allowance is made for this factor, it would be reasonable to expect that at least two-thirds of this extent, i.e., about 120,000 acres of the area now uncultivated in the Dry Zone during Maha could be rendered cultivable, if the institutional factors which now prevent the cultivation of these lands could be satisfactorily settled. These institutional factors, it might be added, are endemic to the area and include such matters as pre-occupation with chena cultivation during the better part of the Maha Season, shortage of man-power, acute shortage of facilities for ploughing, want of capital, seed, etc., at the proper time.

9. In the Wet Zone, about 54,000 acres are uncultivated during Maha. As in Yala, flooding is again a serious limiting factor, partiticularly in the Low-country Wet Zone where practically the whole of the uncultivated acreage lies. On the assumption again that the rain-fed extent of this case would be the most vulnerable from the point of view of flooding and at least half the uncultivated acreage under minor works would have to be written off for the same reason, a reasonable chance seems to exist to increase the crop area in Maha in the Wet Zone by approximately 15,000 acres, covering the area under major works and about half the area under minor works.

10. It would be observed from the comments made in the preceding paragraphs that a reasonable prospect exists for increasing the crop area by approximately 85,000 acres during Yala and 135,000 acres in Maha within a reasonable period of time and without substantial capital outlays, if Government were to take positive action, in selected areas, to investigate and remove the various factors that now prevent the cultivation of these lands.

11. According to preliminary studies already made by the Department of Agrarian Services, it is almost certain that this investigation will reveal that the non-cultivation of cultivable lands is due primarily to one or more of the following reasons, viz:—

(a) Lack of adequate irrigation facilities;
(b) Institutional defects; and
(c) Management deficiencies.

12. They key role played by irrigation in paddy cultivation is generally well recognised and, over the years, considerable attention has been paid to this aspect of the problem. On the other hand, even where such facilities have already been provided, large extents still remain uncultivated (for instance, the large extents uncultivated under major schemes even during the Maha Season) due to defects in the institutional and management aspects of paddy cultivation. These aspects have not received sufficient attention in the past and will therefore demand very high priority in any programme calculated to overcome the problem of uncultivated paddy lands in Ceylon. The institutional and management problems which this investigation will disclose will include, among others, the following:—

(*a*) Shortage of capital;
(*b*) Shortage of man-power, particularly in the large producing areas during cultivation and harvesting periods;
(*c*) Shortage of buffalos and/or tractors for ploughing;
(*d*) Greater attraction of alternative employment, particularly in the Wet Zone districts;
(*e*) Disputes regarding land and ownership;
(*f*) Alleged infertility of soil for regular cultivation;
(*g*) Salinity and salvinia infestation; and
(*h*) Indifference on the part of owners and/or cultivators.

While the institutional problems could be solved largely by Governmental action, the solution of the management problems will necessitate the involvement of the cultivators themselves.

13. It is proposed that during the 3 years 1965/66 to 1967/68, the Department of Agrarian Services should undertake a programme of action which would bring under cultivation approximately 100,000 acres out of the total extent of land which was uncultivated in 1964 and which could be rendered cultivable by a solution of the problems referred to earlier. The subsequent paragraphs of this paper will outline in broad detail the staff, equipment and funds required for the implementation of this project and the policy decisions which are essential to support this programme.

B—Implementation Proposals

14. It will be clear that the success of the project will depend primarily on the initial investigation to isolate areas requiring attention, to question cultivators and ascertain their reasons for non-cultivation, to establish firmly, in the light of all available information and evidence in the area, the actual reasons for non-cultivation and then recommend the corrective action necessary. For this purpose, it will be necessary to set up 4 investigation units for a period of about

2 years, each unit to consist of 3 officers (one from Agrarian Services, one from Agriculture and one from Irrigation) of whom one should be a Staff Officer. Each unit will function in particular areas assigned to them for about a fortnight, and then return to Headquarters for another week or 10 days for the preparation of the report and formulation of proposals including, in the case of irrigation works, preparation of designs, plans and estimates. These can then be examined and passed by the Head Office and referred to the District Officers for execution. 4 officers of the grade of A.C.A.SS. will be required to man these teams. Alternatively comparable officers of other departments may be seconded for this purpose. 4 Agricultural Officers or Instructors and 4 Technical Assistants will have to be seconded from the Agriculture and Irrigation Departments for work in connection with this project. It can be stated with absolute certainty that if this work of investigation is assigned as a part-time job to Govt. Agents or other District Officers, it will not be possible to tie up the progress of the project to a particular time schedule.

15. Each investigation unit should be provided with a jeep or station wagon for their travelling and until such time as new vehicles are purchased, arrangements should be made to obtain vehicles on loan from other departments. In addition, team members should be allowed any casual travelling necessary to contact District and Divisional Officers, visit Co-operative Societies, etc., when required to collect local information or verify data supplied by cultivators. Financial provision required for this purpose should be made in the Votes of the Department of Agrarian Services. The estimated cost of the investigation will be Rs. 224,000 made up as follows:—

	1965-66	*1966-67*	*1967-68* *2 units only*
	Rs.	*Rs.*	*Rs.*
4 Staff Officers (say A.C.A.SS.) salaries and allowances ..	**24,000 ..**	**24,000 ..**	**12,000**
Travelling of Staff Officers at Rs. 250 per month	**12,000 ..**	**12,000 ..**	**6,000**
Travelling of other team members (8 officers) at Rs. 150 per month ..	**14,400 ..**	**14,400 ..**	**7,200**
4 jeeps, including running costs and repairs ..	**58,000 ..**	**20,000 ..**	**20,000**
	108,400	**70,400**	**45,200**

16. At the Head Office level, there should be a small branch consisting of a Chief Clerk E.C.C. Grade I or Grade II, and Accounts Clerk E.C.C. Grade II and about 3 G. C. C. Officers to control the

field operations, keep a record of progress of investigations and execution of works, evaluate results and attend to all correspondence with District Officers, Government Agents, etc. In view of the existing shortages of staff, it is essential that these officers should be provided physically and not merely shown on the cadre as has often happened in the past. The estimated cost of the clerical staff will be approximately Rs. 16,000 a year.

17. As the investigation proceeds, the particular areas requiring attention and the type of attention necessary would become firmly established. It is proposed that these action programmes, which arise from the investigation, should be undertaken by the departments normally responsible for such action. As there is insufficient data at present to estimate, even approximately, the cost of such action programmes, it is suggested that, in the first instance, the cost be debited to the funds already provided for in the 1965/66 Estimates and additional funds, if any are required, be obtained by virement or supplementary procedure at a later stage.

18. A definite increase can however be forecast in the Minor Irrigation Votes of the Department of Agrarian Services although the extent of such increase cannot be accurately stated at this stage. Rs. 6 million has been provided under this Vote for 1965/66. It is suggested that this provision be immediately increased to 7 million and an allocation of Rs. 8.5 million and Rs. 10.5 million be tentatively earmarked for 1966/67 and 1967/68 respectively. The department is at present technically equipped to undertake single works costing less than Rs. 30,000 up to a maximum of Rs. 6 million a year. With the recent appointment of a retired qualified Engineer as a Deputy Commissioner of Agrarian Services (Technical), it is now possible to increase the maximum limit of individual works to approximately Rs. 75,000. However, to help in the preparation of designs and estimates and supervised such works, it is necessary to obtain on loan from the Department of Irrigation about 16 Technical Assistants and 3 Draughtsmen for a period of about 3 years. Further, to help in the field inspection of works in progress, it is necessary for the Department of Agrarian Services to recruit 50 overseers, at the rate of 25 overseers per year, in each of the 2 years 1965/66 and 1966/67. After 6 months of initial training at Katubedde, they will be absorbed permanently into the cadre of the Department, which will thereafter be able to undertake a much large volume of work than it does at present. The department has at present 43 officers of the grade

of overseers for such supervision. The estimated cost of the increased staff, other than the salaries of the seconded staff, will be as follows:—

	1965–66 *Rs.*	*1966–67* *Rs.*	*1967–6* *Rs.*
Travelling of 16 Technical Assistants at Rs. 150 per month	28,800	28,800	28,800
Salaries of overseers	49,000	98,000	98,000
Travelling of overseers (cycle allowance)	6,500	13,000	13,000
	84,300	139,800	139,800

19. Apart from these requirements of staff and equipment, as outlined in the preceding paragraphs, it will also be found that a number of policy decisions would be necessary to overcome the institutional and management handicaps to cultivation. The field investigations would reveal these handicaps in sharper focus and in their local setting, but certain broad problems can be outlined here for immediate consideration and decision.

20. It will be found that in several areas lack of capital and the lack of facilities for ploughing would be given as the principal reasons for non-cultivation. Apart from water, the cultivator needs seed and facilities for ploughing as a basic minimum. Fertilizers would also be an additional requirement indispensable in certain areas. In the ultimate analysis, however, it will be observed that if facilities for ploughing can be provided without exception in all areas, the cultivator could be relied upon to find the seed he requires. On the one hand, the buffalo population has declined in practically all districts, while on the other, restrictions on imports have reduced the number of working tractors in the country. Even where tractors are available, tractor hire rates have consequently increased to exorbitant levels—sometimes as high as one-third the crop or about Rs. 120 per acre. To overcome this problem and to ensure that cultivable paddy land is not left uncultivated due to want of essential ploughing facilities, it is necessary that Government adopts a more liberal policy in the import of agricultural tractors. The recommendation made in the paper entitled 'Proposals for Increasing Paddy Production' on this subject would therefore be applicable in this instance as well.

21. It will also be found that in certain districts, particularly in the larger producing areas, such as Anuradhapura, Batticaloa, Polonnaruwa, Amparai, Hambantota, etc. there is an acute shortage of cultivators. The shortage is aggravated further by chena cultivation. This shortage of man-power should be another reason for the

rgent import of agricultural tractors to, at least, partially mechanise he cultivation of paddy in these districts. Incidentally, this shortage f man-power should be taken into consideration when proposals re made for the development of new lands for paddy cultivation in hese districts on a V. E. basis.

22. The problems that would be most difficult to solve in connection vith the project will be found to arise from management deficiencies. rior to 1958, the management of paddy cultivation rested on the rovision of the Irrigation Ordinance. Although the Ordinance clearly aid down the duties and obligations of every person who had anything o do with paddy cultivation and provided for effective remedies vhenever such duties were overlooked or neglected, the enforcement f these remedies came to be gradually relaxed almost completely n some districts, while in others such enforcement was kept at the ninimum possible level. With the enactment of the Paddy Lands Act of 1958, which contained provisions diametrically opposed to those vith the Irrigation Ordinance, the situation deteriorated rapidly. It vas then found that the provisions of either Ordinance could not be egally enforced in view of the conflicting provisions in the other. For nstance, the obligations of proprietors under the Irrigation Ordinance vere transferred by the Paddy Lands Act to cultivators, but penalties or non-performance were still enforceable only under the Irrigation Ordinance against proprietors. Likewise, the Paddy Lands Act bolished Irrigation Headmen, but Cultivation Committees which were substituted in their place had no status under the Irrigation Ordinance. Proposals to amend the Irrigation Ordinance to bring it into line with the Paddy Lands Act had been submitted about 3 years ago and the Draft Amending Bill had also been finalised about a year ago. It is essential that these conflicts be resolved without further delay, as until such time as this is done, the management and control of paddy cultivation and the proper maintenance of irrigation structures, channels and bunds still remain largely a matter of individual preference unenforceable in law. It would be found that much cultivable land remains uncultivated because irrigation or drainage channels have been obstructed or diverted for other purpose or because the carrying capacity of these channels had been reduced by years of neglect. Failure to adhere to dates fixed for ploughing or sowing, to set up fences or for the removal of cattle from paddy fields, etc. are other notable instances of the failure of management to make the maximum use of cultivable land.

23. Apart from setting the management and control of cultivation on a sound legal footing it is also vitally necessary that the new organisation, which has been set up under the Paddy Lands Act to perform these managerial functions, be supported completely and

without reservations by all agencies of Government concerned with the development of paddy cultivation. Land disputes and indifference on the part of owners or cultivators of paddy lands are a frequent cause of non-cultivation in several districts. In certain districts, the competition offered by alternative employment also contributes largely to the neglect of cultivable paddy lands. Provisions exist under the Paddy Lands Act for the cultivation of such lands which have remained fallow for two or more successive seasons by the appointment of tenant cultivators. The implementation of these provisions, however, pre-supposes the existence of an effective Cultivation Committee in the area and the availability of cultivators who are capable of undertaking cultivation at comparatively short notice. Although these conditions do not exist at present in all areas, there appears to be very little doubt that an efficient Cultivation Committee in the best Guarantee for the maximum utilization of cultivable paddy land in Ceylon. In the present context, it is, in any case, the only available medium by which, the cultivators themselves can be involved in finding a permanent solution to the problems of management on paddy lands.

24. Most of the other difficulties connected with the implementation of the Paddy Lands Act have now been set right by the Amending Act of 1964. The administrative and policy decisions which are now necessary to work the Act effectively are as follows :—

(a) Since the Act cannot be implemented successfully only in parts, the maximum possible support is needed to implement the tenurial provisions of the Act. For over one year, this aspect of the work has been brought to a complete standstill pending a decision by the Supreme Court on the jurisdiction of the department to make orders on the restoration of evicted tenants.

(b) Under Section 36 (A) of the Act, Cultivation Committees have been statutorily vested with the duty of laying down standards for paddy cultivation and Sections 18, 19 and 20 provide for a procedure for enforcing such standards. To achieve these objectives, it is essential that the agricultural extension services of Government be geared to work with these Committees, help in setting up these standards and enforcing them where necessary.

(c) The staff needed to implement the provisions of the Act, as amended by the Act of 1964, should be provided without further delay.

C—Summary of Proposals

25. The proposals made in this paper towards finding a solution to the problem of uncultivated but cultivable paddy lands in Ceylon and, in particular, to increase the crop area by approximately 100,000 acres by 1967-68 can now be summarised as follows :—

(i) 4 investigating units should be set up to locate 100,000 acres of uncultivated land which could be rendered cultivable between 1965-66 and 1967-68, to examine the causes for non-cultivation in the selected area and to suggest remedial action for the elimination of these causes. The cost of this investigation is estimated at Rs. 224,000 for the entire period of 3 years (paragraph 15) ;

(ii) the remedial action necessary, as disclosed by the investigation, should be carried out by the Departments which are normally responsible for such action. They must be financed by these Departments from their own votes, supplemented, if necessary, when more data is available, either by virement procedure or supplementary provision (paragraph 17);

(iii) a small branch, consisting of 5 clerical officers, should be established, to control the field operations, keep a record of the progress of investigations and execution of works, evaluate ressults, etc. The estimated cost of this secretariat will be Rs. 48,000 for the entire period of 3 years (paragraph 16) ;

(iv) the minor irrigation section of the Department of Agrarian Services should be strengthened by the secondment of 16 Technical Assistants and 3 Draughtsmen from the Department of Irrigation and the recruitment of 50 field overseers in order to enable the department to undertake works costing up to Rs. 75,000 and to step up its work capacity from Rs. 6 million a year to Rs. 7 million in 1965-66; Rs. 8.5 million in 1966-67 and Rs. 10.5 million in 1967-68. The cost of the expanded staff and their travelling allowance, but excluding the salaries of the seconded staff, is estimated at Rs. 363,900 for the entire period of the project (paragraph 18);

(v) with a view to solving the problem created by shortage of manpower in the main producing districts and the shortage of buffaloes for ploughing throughout the country, the present policy regarding the import of agricultural tractors should be relaxed. In the paper entitled 'Proposals for Increasing Paddy Production', it is recommended that foreign exchange should be released for the import of 500 (four wheel) and 500 (two wheel) agricultural tractors annually, together with implements and spares (paragraphs 20 and 21) ;

(vi) the conflicts in legislation as contained in the Irrigation Ordinance and the Paddy Lands Act must be resolved immediately as these conflicts have, more or less, completely paralysed the management aspects of paddy cultivation and the control and conservation of irrigation structures and irrigation water (paragraph 22);

(vii) with a view to restoring proper management of paddy cultivation and making the maximum use of available paddy lands throughout the country, the agricultural extension services must be linked with Cultivation Committees, the staff necessary for the proper implementation of the Paddy Lands Act should be provided and above all the present impasse reached in the enforcement of the tenurial provisions should be resolved at an early date (paragraphs 23 and 24).

D—Costs and Benefits

26. If the above proposals are accepted, the financial provision that should be made in the estimates of the Department of Agrarian Services is as follows :—

	1965–66 *Rs.*	*1966–67* *Rs.*	*1967–68* *Rs.*
Vote 1—Sub-head 1, 2 and 3—Salaries and Allowances :			
4 Assistant Commissioners	24,000	24,000	12,000
5 Clerical Officers	16,000	16,000	16,000
Vote 2—Sub-head 4—Travelling :			
4 Assistant Commissioners	12,000	12,000	6,000
8 Investigating Team Members	14,400	14,400	7,200
Vote 6—Sub-head 1, 2 and 3—Salaries and Allowances :			
Overseers	49,000	98,000	98,000
Vote 6—Sub-head 4—Travelling :			
16 Technical Assistants	28,800	28,800	28,800
Cycle allowance for Overseers	6,500	13,000	13,000
Total	150,700	206,200	181,000
Vote 7—Sub-head 9—Minor Irrigation :			
Excess over provision already agreed upon in 1965–66 Estimates—including purchase of 4 Jeeps, running costs and repairs	Rs. 1 million	Rs. 2·5 million	Rs. 4·5 million

The additional staff requirements for the implementation of the Paddy Lands Act are not included above, as they have already been referred to in two separate Cabinet Papers.

27. It will be seen that the financial implications of these proposals are moderate. As compared with this, the cultivation of 100,000 acres of paddy land which now remain uncultivated will mean in terms of output an increased annual production of at least 3.5 million bushels of paddy (at an average rate of 35 bushels per acre) or 50,000 tons of rice valued at approximately Rs. 25 million in foreign exchange. It is estimated, however, that the actual increase in production will be much larger as the administrative and policy decisions taken in connection with this project will affect a much larger area than the selected 100,000 acres. The expansion of the crop area, within the acreage selected, is expected to be 20,000 acres by the end of 1965-66; 50,000 by the end of 1966-67; and 100,000 by the end of 1967-68.

TABLE I

Asweddumized Paddy Lands

	Total Area	*Cultivated in Maha 1963–64*	*Cultivated in Yala 1964*	*Not cultivated in Maha 1963–64*	*Not cultivated in Yala 1964*
CEYLON	1,249,156	1,013,611	571,587	235,545	677,569
Dry Zone :					
1. Jaffna	80,649	73,040	11,239	7,609	69,410
2. Mannar	34,037	30,024	4,334	4,013	29,703
3. Vavuniya	56,431	48,291	4,424	8,140	52,007
4. Anuradhapura	126,115	92,277	38,281	33,838	87,834
5. Polonnaruwa	60,416	51,706	43,018	8,710	17,398
6. Trincomalee	48,478	33,370	21,719	15,108	26,759
7. Batticaloa	98,905	70,266	20,288	28,639	78,617
8. Amparai	104,727	76,575	55,027	28,152	49,700
9. Moneragala	17,700	14,258	3,605	3,442	14,095
10. Hambantota	44,320	31,817	33,425	12,503	10,895
Total	671,778	521,624	235,360	150,154	436,418
Dry cum Wet Zone :					
11. Puttalam	32,720	25,475	4,207	7,245	28.513
12. Kurunegala	151,949	146,107	60,982	5,842	90,967
13. Matale	25,547	22,338	14,312	3,209	11,235
14. Badulla	31,086	16,805	19,583	14,281	11,503
Total	241,302	210,725	99,084	30,577	142,218

TABLE I—*(contd.)*

	Total Area	Cultivated in Maha 1963–64	Cultivated in Yala 1964	Not cultivated in Maha 1963–64	Not cultivated in Yala 1964
Wet Zone :					
15. Colombo	65,395	54,790	26,981	10,605	38,414
16 Kalutara	44,749	33,921	35,227	10,828	9,522
17. Galle	48,534	35,497	40,679	13,037	7,855
18 Matara	49,404	40,290	42,317	9,114	7,087
19. Ratnapura	36,005	26,788	25,558	9,217	10,447
Total	244,087	190,286	170,762	52,801	73,325
Mid Zone :					
20. Kegalla	27,329	27,042	20,669	287	6,660
21. Kandy	46,522	45,767	35,548	755	10,974
22. Nuwara Eliya	18,138	17,167	10,164	971	7,974
Total	91,989	89,976	66,381	2,013	25,608

TABLE II

Land Irrigated under Major Schemes

	Total Area	Cultivated in Maha 1963–64	Cultivated in Yala 1964	Not cultivated in Maha 1963–64	Not cultivated in Yala 1964
CEYLON	365,949	290,153	226,208	75,796	139,741
Dry Zone :					
1. Jaffna	23,096	21,168	11,180	1,928	11,916
2. Mannar	22,332	20,256	2,430	2,076	19,902
3. Vavuniya	10,960	9,474	2,257	1,486	8,703
4. Anuradhapura	34,311	32,057	19,761	2,254	14,550
5. Polonnaruwa	46,235	44,048	37,574	2,187	8,661
6. Trincomalee	23,866	15,097	20,672	8,769	3,194
7. Batticaloa	41,224	26,889	15,842	14,335	25,382
8. Amparai	65,087	43,339	51,614	21,748	13,473
9. Moneragala	5,540	5,083	2,139	457	3,401
10. Hambantota	32,689	22,764	26,350	9,925	6,339
Total	305,340	240,175	189,819	65,165	115,521

TABLE II—(*contd.*)

	Total Area	Cultivated in Maha 1963-64	Cultivated in Yala 1964	Not cultivated in Maha 1963-64	Not cultivated in Yala 1964
Dry Cum Wet Zone :					
11. Puttalam	3,937	3,507	1,378	430	2,559
12. Kurunegala	18,505	17,913	11,983	592	6,522
13. Matale	2,447	2,368	1,918	79	529
14. Badulla	5,635	4,525	3,223	1,110	2,412
Total	30,524	28,313	18,502	2,211	12,022
Wet Zone :					
15. Colombo	7,276	4,104	680	3,172	6,596
16. Kalutara	nil	nil	nil	nil	nil
17. Galle	1,655	362	595	1,293	1,060
18. Matara	9,052	7,255	7,823	1,797	1,229
19. Ratnapura	3,376	1,424	2,228	1,952	1,148
Total	21,359	13,145	11,326	8,214	10,033
Mid Zone :					
20. Kegalla	nil	nil	nil	nil	nil
21. Kandy	6,623	6,445	5,252	178	1,371
22. Nuwara Eliya	2,103	2,075	1,309	28	794
Total	8,726	8,520	6,561	206	2,165

TABLE III

Land Irrigated under Minor Schemes

	Total Area	Cultivated in Maha 1963-64	Cultivated in Yala 1964	Not cultivated in Maha 1963-64	Not cultivated in Yala 1964
CEYLON	370,411	282,715	141,749	87,696	228,662
Dry Zone :					
1. Jaffna	2,145	1,850	59	295	2,086
2. Mannar	7,613	6,443	1,904	1,170	5,709
3. Vavuniya	21,082	17,862	2,117	3,220	18,965
4. Anuradhapura	90,297	58,984	18,520	31,313	71,777
5. Polonnaruwa	9,317	3,327	5,054	5,990	4,263
6. Trincomalee	5,616	3,951	1,047	1,665	4,569
7. Batticaloa	7,246	3,653	4,126	3,593	3,120
8. Amparai	5,106	2,529	2,397	2,577	2,709
9. Moneragala	7,149	5,617	1,451	1,532	5,698
10. Hambantota	7,660	5,718	4,436	1,942	3,224
Total	163,231	109,934	41,111	53,297	122,120

TABLE III—(*contd.*)

	Total Area	*Cultivated in Maha 1963-64*	*Cultivated in Yala 1964*	*Not cultivated in Maha 1963-64*	*Not cultivated in Yala 1964*
Dry cum Wet Zone :					
11. **Puttalam**	23,292	18,463	2,690	4,829	20,602
12. **Kurunegala**	62,584	58,442	14,909	4,142	47,675
13. **Matale**	16,765	13,775	9,101	2,990	7,664
14. **Badulla**	20,598	9,083	15,115	11,515	5,483
Total	123,239	99,763	41,815	23,476	81,424
Wet Zone :					
15. **Colombo**	4,493	3,857	1,420	636	3,073
16. **Kalutara**	4,014	3,519	3,198	495	816
17. **Galle**	3,716	2,345	2,981	1,371	735
18. **Matara**	8,644	6,548	8,494	2,096	150
19. **Ratnapura**	20,376	15,474	15,050	4,902	5,326
Total	41,243	31,743	31,143	9,500	10,100
Mid Zone :					
20. **Kegalle**	5,816	5,733	4,349	83	1,467
21. **Kandy**	21,207	20,806	14,555	401	6,652
22. **Nuwara Eliya**	15,675	14,736	8,776	939	6,899
Total	42,698	41,275	27,680	1,423	15,018

TABLE IV

Rainfed Paddy Areas

	Total Area	Cultivated in Maha 1963-64	Cultivated in Yala 1964	Not cultivated in Maha 1963-64	Not cultivated in Yala 1964
CEYLON	512,796	440,743	203,630	72,053	309,166
Dry Zone :					
1. Jaffna	55,408	50,022	nil	5,386	55,408
2. Mannar	4,092	3,325	nil	767	4,092
3. Vavuniya	24,389	20,955	50	3,434	24,339
4. Anuradhapura	1,507	1,236	nil	271	1,507
5. Polonnaruwa	4,864	4,331	390	533	4,474
6. Trincomalee	18,996	14,322	nil	4,674	18,996
7. Batticaloa	50,435	39,724	320	10,711	50,115
8. Amparai	34,534	30,707	1,016	3,827	33,518
9. Moneragala	5,011	3,558	15	1,453	4,996
10. Hambantota	3,971	3,335	2,639	636	1,332
Total	203,207	171,515	4,430	31,692	198,777
Dry cum Wet Zone :					
11. Puttalam	5,491	3,505	139	1,986	5,352
12. Kurunegala	70,860	69,752	34,090	1,108	36,770
13. Matale	6,335	6,195	3,293	140	3,042
14. Badulla	4,853	3,197	1,245	1,656	3,608
Total	87,539	82,649	38,767	4,890	48,772
Wet Zone :					
15. Colombo	53,626	46,829	24,881	6,797	28,745
16. Kalutara	40,735	30,402	32,029	10,333	8,706
17. Galle	43,163	32,790	37,103	10,373	6,060
18. Matara	31,708	26,487	26,000	5,221	5,708
19. Ratnapura	12,253	9,890	8,280	2,363	3,973
Total	181,485	146,398	128,293	35,087	53,192
Mid Zone :					
20. Kegalla	21,513	21,309	16,320	204	5,193
21. Kandy	18,692	18,516	15,741	176	2,951
22. Nuwara Eliya	360	356	79	4	281
Total	40,565	40,181	32,140	384	8,425

Research Programme of the Department of Agriculture

RESEARCH PROGRAMME OF THE DEPARTMENT OF AGRICULTURE

A plan of agricultural development for the immediate future in respect of the crops handled by the Department of Agriculture would primarily emphasise the need for maximisation of production of food for the home market and the conservation of the much needed foreign exchange sent out annually for the import of these commodities. It would also develop as far as possible the minor export crops which in addition to the major export crops like tea, rubber and coconut would increase our foreign exchange earnings.

Increased production would have to be achieved by the intensification of cultivation of those acreages already under these crops and an increase of the area under cultivation wherever possible. The programme in agricultural research should therefore be geared to assist this plan of increased production by contributing improved varieties or information on more efficient fertilizer or cultural practices on the one hand and by reducing to a minimum the untaken harvest due to pests and diseases in field or storage on the other.

In a National Plan of Development there has to be a system of priorities and for this purpose the research and experimental programme is arranged in the following order of priority in respect of different crops :—

1. Rice
2. Subsidiary food-stuffs
    - (a) Chilli
    - (b) Bombay onion
    - (c) Shallots
3. Vegetables
4. Fruits
5. Pastures
6. Economic annual crops
    - (a) Cereals—Maize, Sorghum, Kurakkan
    - (b) Pulses—Pigeon pea, Green and Black gram, Lentils, Cowpea

- (*c*) Oil crops—Groundnut, Gingelly
- (*d*) Fibre crops—Cotton, Kenaf
- (*e*) Condiments—Garlic, Corriander, Fennel, Mustard, etc.
- (*f*) Miscellaneous crops—Tobacco, Ginger and Tumeric

7. Minor export crops

Cinnamon, Cloves, Nutmeg, Cardamoms, Pepper, Citronella, Lemongrass.

In addition to the above priorities there are certain basic investigations that should be pursued simultaneously in order to supplement the applied research investigations in most fields.

There are also certain long-term investigations that may not necessarily be concluded within the five-year term but on which sustained attention is necessary. These will receive consideration according to the facilities available after the priority projects have been taken in hand.

For the full implementation of the programme of research for the next five years sufficient staff and facilities are necessary. The requirement of extra staff is submitted as an appendix to this memorandum—whereas the need for new stations are mentioned at the appropriate places in connection with the projects themselves.

PROGRAMME OF RESEARCH

Arable Crops

Rice

The general objectives of rice research are :

- (i) Breeding of improved varieties of different age groups and adapted to different areas of the country.
- (ii) Development of cultural, weed control and fertilizer practices that would be associated with these varieties.
- (iii) Development of effective and economic methods for the control of Pests and Diseases.
- (iv) Development and testing of suitable agricultural machinery.
- (v) Investigation of improved methods of storage.

All aspects of rice research will be closely co-ordinated to ensure a well balanced and meaningful research effort. The broad programmes of research and experiments are given below:

Rice Breeding

(i) *Breeding for General Improvement*

The most important contribution that could be made towards the objective of increased production of rice is the breeding of fertilizer responsive high yielding varieties with resistance to diseases, resistance to lodging and grain shedding, high milling out turn, superior rice quality and wide adaptability. This programme has already contributed effectively to the increase of rice production in the Island with varieties like H_4 that have made a spectacular impact on our rice yields. This line of work which seeks to obtain better and improved rice varieties will be continued and intensified. There is a need for improved varieties of (*a*) short duration photoperiod insensitive varieties of 90-120 day duration for a greater part of the rice acreage and (*b*) long aged varieties of 150-180 day duration for specific areas in the country.

NEW STATIONS REQUIRED

For the intensification of this programme it is essential to establish small field experimental stations at Gampola and Minipe in the Kandy District, in the Gal Oya Valley, in the Walawe Scheme and at suitable locations in the paddy tracts of Puttalam. Stations are needed at Kurunegala, Kegalle and Colombo Districts which grow the long aged varieties.

(ii) *Breeding for Low Temperature Tolerance*

Although varieties like H_4 can be grown in some of the hill country areas the yields are not too satisfactory and a specific line of breeding of cool tolerant varieties is necessary to increase the yields in these areas.

This work is being carried out at Pussellawa. Facilities available at Rahangala Research Station for this work are inadequate. A suitable rice field is essential at this centre.

(iii) *The Selection and Breeding of Strains of Rice for Tolerance to Conditions of Poor Drainage particularly to Hydrogen Sulphide Toxicity for the Low Country Wet Zone*

These conditions affect a large area of the low country wet zone covering Ratnapura, Bombuwela and Labuduwa. It is proposed to further develop the Bombuwela Experiment Station for intensification of this programme.

(iv) *Selection and Breeding of Strains of Rice for Drought Resistance for the Rainfed Areas*

This project centred at Maha Illuppallama has already brought out considerable information regarding better strains in varieties which are now being tested under rainfed conditions in cultivators' fields in the dry zone. The breeding programme is continued for producing higher yielding shorter aged varieties. It is proposed to extend this work to stations at Paranthan, Jaffna and Batticaloa.

(v) *Breeding for Salt and Flood Resistance*

Not much progress was made in these two objectives owing to the lack of suitable stations for these two projects. A site at Kilinochchi is explored for Salinity resistance work while a station is required in the wet zone for flood resistance work. The programme will be developed after the two stations have been established.

Rice Agronomy

The information already obtained in past investigations on the effects and interactions of plant density, cultural practices (transplanting, row seeding and broadcasting) levels and times of fertilizer application and variety on grain yield in different areas in the Island would be extended. Moreover these agronomic practices should be re-investigated with the newer hybrid strains that emerge from the breeding programme. The information obtained from these experiments would be used as a basis for planning trials in cultivators' fields with a view to making more accurate recommendations to cultivators. These investigations will be carried out at the rice experiment and research stations mentioned earlier.

Rice Soil Studies

Various lines of investigation are pursued to obtain a better understanding of rice soils and the nutrition of the rice plant with a view to increasing yields. These are as follows:—

(i) The study of rice soils and factors controlling the use of different forms of fertilizer and soil amendments in different rice soils in Ceylon.

(ii) A survey of the mineral contents of irrigation water used in rice cultivation.

(iii) The chemistry of rice soils and related studies.

(iv) Investigations of saline and alkaline soils.

(v) Studies on fertiliser practices in rice using radioisotopes.

It is proposed to develop the following lines of investigation in the future when more staff is available :—

- **(vi) The co-relation of rapid chemical tests with yield response to fertilizer.**
- **(vii) Soil amelioration studies.**
- **(viii) Rice soil surveys.**

A Japanese Expert is expected shortly to develop further our investigations on rice soil surveys.

Rice Physiology

Physiological investigations are basically essential in the planning of breeding programmes and in developing efficient cultural and fertilizer practices. Accordingly the following lines of work have been initiated and will continue to be further developed :—

- **(i) Study of physiological and nutritional factors influencing grain yield in rice.**
- **(ii) Physiological problems associated with poor drainage conditions with a view to developing the remedial measures.**
- **(iii) Investigation of physiological reactions of different varieties to low temperature.**
- **(iv) Basic studies on water use in rice and the role of water in rice cultivation in order to ensure the most efficient use of water.**

Rice Pests

In the past a considerable amount of work has been carried out in the study of and the control of pests of rice such as stem borer, gall fly, etc., which take a heavy toll of our rice crop. Whereas effective control measures are available for some of them, there are still others that reqire further investigation. The position is further aggravated by the possibility of these pests building up resistence to the currently used insecticides. Research therefore will have to be continued on the following lines :—

- **(i) Study of the biology, ecology and control of the stem borer and the gall fly which are two important pests of paddy.**
- **(ii) Screening of rice varieties for resistance to attack from stem borer and gall fly.**

(iii) Paddy Pentatomid Bug, Paddy Swarming Caterpillar, Padd Stem Fly, Paddy Leaf Hoppers and Paddy Bugs are a major pests of paddy. Studies are in progress to evaluat possible resistance to insecticides shown by these pests an to improve methods of control already available an explore biological methods of control.

(iv) Studies on residues of insecticides used in the control of ric pests.

Rice Diseases

Five diseases of rice, four caused by fungi, namely Blast diseas Brown Spot disease, Sheath Blight disease and Stem Rot and on caused by Nematodes—White Tip disease, are of considerable impor tance. For some of these diseases, control measures are alread available but need to be further improved. For others, effectiv control should be found. There are a number of other diseases, e. root rot, bacterial root rot and several suspected virus diseases of ric that also need attention. The problem of Blast disease speciall requires continual research as the fungus can develop new an virulent strains which can attack our new hybrids. Therefor research will be continued on the following lines :—

(i) Screening of rice varieties for resistance to these diseases.

(ii) Investigations of chemical control methods.

(iii) Study of Blast disease and its physiological races.

Subsidiary Food Crops

The area under arable crops other than rice is limited. Significan increases in production can therefore come only from an increase i the acreage under these crops. At present arable crops are grow mainly under chena cultivation and the most effective method o increasing production is the provision of irrigation facilities for th cultivation of these crops in the dry zone.

(a) Chilli

Past investigations have shown that one of the important limitin factors in the development of chilli production is the presence o certain virus diseases. Most of these viruses have now been ident fied and disease surveys have brought out information on the mos commonly present viruses and their pattern of spread.

The most important problem for research on this crop is the selection and breeding of varieties which are resistant or tolerant to these diseases and give high yields. This problem is a complicated one, as the varieties selected would have to be resistant or tolerant to more than one virus. The possibility of using short aged or early varieties, which by their earliness may escape the ravages of the viruses are also under study. Simultaneously cultural, fertilizer and irrigation practices for increasing yields and for economic chilli production should be investigated.

The following research programme has to be intensively carried out at Maha Illuppallama, Jaffna and Peradeniya :—

(i) Breeding for resistance to several virus diseases.

(ii) Fertilizer, cultural and irrigation investigations.

(iii) Investigation and control of chilli virus diseases.

For the implementation of the above programme laboratory and insect proof facilities are required for Jaffna and Maha Illuppallama respectively.

(b) Bombay Onion

Recent experimental evidence indicates that Bombay onions can be successfully cultivated under irrigation on the reddish brown earths of the dry zone. One of the chief factors that will limit the expansion of this crop is the non-availability of locally produced seed in quantity. There is also the problem of controlling damping off of seedlings in nurseries. The cultural and irrigation aspects for maximizing yields would also have to be investigated.

The following investigations would be carried out :—

(i) Study of factors controlling seed production.

(ii) Variety, cultural and fertilizer investigations.

(iii) Control of damping off of nurseries.

(iv) Investigations on irrigation practices.

(c) Shallots (Red Onions)

Ceylon can become self-sufficient in its needs of red onions if adequate quantities of onions can be stored during the three month period from November to January when heavy rains prevent the successful cultivation of red onions anywhere in the Island. More information on methods of storage of red onions is required. There is also a need for increasing yield per acre on the existing lands. These investigations need intensifying.

(i) Investigations on methods of storage of red onions.
(ii) Varietal, cultural and fertilizer investigations.
(iii) Study of the irrigation requirements of red onions.

These experiments are at present being carried out on a restricted programme at Tinnevelly, in Jaffna.

Vegetables

Apart from selection of a number of low country vegetables and the investigation of the control of certain pests and diseases, research on vegetables has not received sufficient attention in the past. Vegetable cultivation is expanding in the country and a considerable expansion and intensification of research on all vegetables is now required. Last year a planned programme of investigation on vegetable problems was initiated. This programme is proposed to be carried out at a number of locations in the development plan for the next five years.

Vegetables—Hill Country Zone

The work is centered at the Agricultural Research Station, Sita Eliya, for the hill country wet zone and at Research Station, Rahangala, for the hill country dry zone. The following lines of investigation will be developed :—

(i) Varietal cultural and fertilizer investigation of exotic vegetables like cabbage, beetroot, carrot, leeks, etc.
(ii) Further investigation of control of pests like cabbage caterpillar, cut worm, etc.
(iii) Investigation into the control of diseases such as club root.

Potatoes

Potato cultivation has received much attention in the past and substantial information on varieties, fertilizers and control of certain pests and diseases has been accumulated. Although the problem of Bacterial Wilt disease which is a serious limiting factor has not been solved, it has been possible to locate areas where the hazards of this disease are apparantly reduced owing to climatic and other factors. Extension of potato cultivation is being developed in these regions.

The research programme will be developed in the following directions :—

- (i) Investigations on conditions that depress the activity of the casual bacterium.
- (ii) Investigation of pests of potato like cutworm.
- (iii) Further varietal, cultural, fertilizer and fungicidal studies.

Vegetables—Low-Country Zone

The department has already during the last two decades made certain selections which are being issued as departmental recommendations. It will, however, be necessary to have varietal trials to test out these varieties against the new varieties which are developed in other countries for the purpose of improving on the existing recommendations. Bandakka varieties which are resistant to disease, have to be developed.

There are also many pests and diseases for which control measures have to be developed or the present methods improved.

An expanded seed production scheme for vegetables is proposed to be established at Pelwehera.

The following research programme will be developed from this year :—

- (i) Varietal, cultural and fertilizer investigations.
- (ii) Breeding of improved varieties.
- (iii) Investigations on the control of pests and diseases.
- (iv) Investigations on irrigation practices.

Manioc, Yams and Sweet Potatoes

Very little attention has been given to these commodities in the past except that there is some information on certain varietal trials. There is considerable potential for use of manioc in the manufacture of sago, starch, etc., and as dried chips in cattle food. The value of sweet potatoes and yams as substitutes for potato and rice need investigation. Varietal, cultural and fertilizer trials are proposed for increasing yields per acre.

Fruits

The potential for fruit cultivation in the different regions of the country is considerable. Research on fruits therefore needs considerable expansion. In the past the fruit research programme was centrally directed by one Horticultural Officer who was responsible for both the research and extension work and production of planting material. At present there are two Horticultural Officers on the cadre but this number is yet inadequate to handle the various problems of a wide variety of fruits.

The fruit research programme will be developed on a zonal basis: Hill Country Zone, the Mid and Low Country Wet Zone and the Dry Zone and the research officers will concentrate on the more important fruits in each respective zone. The research aspect of canning and fruit processing will be the responsibility of the Food Technologist of the department.

The production and distribution of planting material is handled by a separate organisation associated with the extension services which will also undertake the advisory work.

Mid and Low-Country Wet Zone

Pineapples

Since the commercial possibilities of pineapple are considerable, with even possibilities of earning foreign exchange, this crop will be given priority among the wet zone fruits. The main problem in regard to pineapple is the control of the Pineapple Wilt disease. Selection of improved varieties and the investigation of cultural and fertilizer practices are essential for increasing production. These investigations are already underway and will be continued for the future.

(i) Testing and selection of improved varieties especially for canning.

(ii) Agronomic investigations, viz. time of planting, spacing, mulching, the use of fertilizers and weedicides, etc.

(iii) Control of fruiting and a study of ' hold on ' plants.

(iv) Investigations in the control of insect pests in particular the wilt diseases of pineapple.

(v) Investigations in the control of pineapple diseases.

Bananas

Bananas constitute the most commonly used fruit in our diet. There are at present a large number of clones being grown, e.g. under the name of " ambul ", some of which are uneconomic. It is necessary to carry out trials to select the best clones of each variety for different areas in the wet and the dry zone for maximum production. Fertilizer and cultural practices are also to be investigated.

The following research programme which has been initiated will be continued :—

(i) Maintenance of varietal collection, variety testing and quality studies.

(ii) Cultural and fertilizer investigations.

(iii) Investigations and control of banana diseases and pests like bunchy top and weevil attack.

Papaw

There has been an increasing and popular demand for papaw in recent times and the price of papaw fruit in the market is very high. In order to satisfy this demand it is necessary to develop varieties of good quality and investigate the cultural and fertilizer aspects for maximum production.

The following investigations on the crop will be carried out :—

(i) Introduction and testing of new varieties.

(ii) Study of varieties for papaw production and canning of fruits after tapping for papain. This study will be done in collaboration with the Food Technologist.

(iii) Investigation of the possibilities for cultivating papaw under coconut.

These investigations have to be carried out in a number of stations, viz. Ambepussa, Kundasale, Walpita, Peradeniya and Horana. It is necessary to produce adequate facilities at some of these stations for this work and it is intended to establish a Horticultural Research Station for the low-country wet zone at Walpita or at some suitable station.

While priority is being given to the crops mentioned above for the mid and low-country wet zone, investigations are also proposed to be carried out in respect of varieties, fertilizer and cultural practices of other fruit crops of this zone such as Mango, Avocado, Limes Lemons, etc.

Dry and Intermediate Zone

A good potential exists in the dry zone for the commercial production of a variety of fruits. The reddish brown earths could be utilized for the cultivation of mango and the Latosols for cashew and mango under rainfed conditions and citrus, grapes and bananas under irrigation.

Most of these crops require varietal improvement for both yield and quality and the programme will lay the greatest emphasis on this aspect of the problem.

In regard to citrus it has already been shown that a virus disease brings about premature decline of most citrus varieties. This is specially aggravated when the plants are growing on unsuitable soils which are badly managed and subjected to water stress in periods of drought. It has been recommended by visiting Citriculturists that the best potentiality for an expanding citrus industry is in the deep, well drained Latosols of the dry zone. In the meantime current research has indicated orange varieties which appear to be more tolerant to the virus than those popular varieties which declined earlier. It is proposed therefore to establish a Pilot Project for citrus research and production with the information so far obtained, with surface irrigation or with underground water in the Latosols of the dry zone.

There is at present a growing interest in the cultivation of grapes, predominently in the North, but most of the varieties which have been so far grown have been sour and not suitable as a dessert fruit. Recent investigations have brought out indications that better varieties could be found and work is being continued in this direction.

The research programme for fruits in this zone will be directed on the following lines :—

Mango

(i) Selection of varieties, study of factors controlling flowering and fruiting.

(ii) Investigation of cultural and fertilizer practices.

(iii) Study of the cultivation of mango in association with pastures.

(iv) Study of the canning qualities of different varieties of mango.

Citrus

(i) Introduction and testing of varieties, oranges, grape fruit, limes, etc. ; testing of varieties for quality and tolerance of virus diseases.

(ii) Study of different methods of propagation.

(iii) Investigation of fertilizer, cultural practices and irrigation techniques.

Grapes

Varietal, cultural and fertilizer investigations.

Cashew

Varietal, cultural and fertilizer investigations.

Bananas

Varietal, cultural and fertilizer investigations and irrigation techniques.

The above programme, except for work done at Bibile on citrus is an entirely new one. The investigational work will be carried out at a number of stations—Maha Illuppallama, Jaffna and a station in the Latosols.

Hill-Country Zone

The Hill-country zone offers distinct possibilities for the cultivation of sub-tropical and temperate fruits. Research on these fruits will be intensified in this zone.

The work will be carried out at two stations: Sita Eliya in the wetter sub-region and Rahangala in the drier sub-region.

Varietal, cultural and fertilizer investigations will be carried out on the following :—

(i) Pears
(ii) Apples
(iii) Peaches
(iv) Strawberries
(v) Mountain Papaw
(vi) Avacado
(vii) Cherimoya
(viii) Grapes

A West German Horticultural Advisor is engaged in this work together with investigations on vegetable research.

Pastures and Fodders

Development of nutritive pastures underlies and is a *sine qua non* of any programme of development of cattle for economic meat and milk production. Pasture development is possible in three regions in the Island, viz. :

(*a*) The dry and intermediate zone.

(*b*) The hill-country zone.

(*c*) Under coconut in the low-country wet zone.

(A) **In the Dry and Intermediate Zone** a considerable amount of information is available as a result of past work on Brachiaria and the carrying capacity of these pastures. Much more work however has to be carried out before we get sufficient information on this subject and investigations will be continued on the following lines :—

(i) Introduction, cultivation and utilisation of pasture grasses, fodder grasses and leguminous plants.

(ii) Improvement of national grasslands in Tamankaduwa and eastern dry zone.

(B) **In the Hill-Country Zone** a programme of pasture development has been initiated at Sita Eliya over a year ago. Hundreds of grasses and legumes have been introduced and some of these show considerable promise. The work is to be extended to Ambewela and Bopatalawa. A station for the investigation of problems of pasture improvement of the hill-country dry zone is proposed to be set up near Bandarawela.

The following investigations will be continued :—

(i) Development of grass by rotation for potato in the hill-country zone.

(ii) Improvement of hill-country grasslands.

(C) **In the Low-Country Wet Zone** pastures under coconut are investigated by the Coconut Research Institute.

Economical Annual Crops

(*a*) (*b*) Cereals, Pulses and Oilcrops

The main crops that require consideration in this section are as follows :—

Cereals : Maize, Sorghum and Kurakkan.

Pulses : Toor Dhal (Pigeon Pea), Green Gram, Black Gram, Cowpea,

Oil Crops : Groundnut, Gingelly.

There is considerable scope for growing the above crops, primarily as rainfed crops, in the vast tracts of the dry zone. Accordingly, during the last few years considerable attention has been given to the selection of improved varieties of these crops at the Research Station at Maha Illuppalama. Already a number of high yielding selections have been obtained. These investigations have to be continued for the search for more improved varieties. In the case of Sorghum a hybridization programme has been directed towards producing a variety as a possible rice substitute.

In Toor Dhal (Pigeon Pea) a limiting factor for its cultivation is a serious insect pest which is being investigated at Maha Illuppallama.

In the case of groundnut there are indications that good yields can be obtained in the dry zone and investigations are been conducted in order to obtain high yielding varieties and suitable cultural and fertilizer practices for achieving good yields under rainfed and irrigated conditions.

The future work on these crops would be as follows :—

(i) Hybridization and selection for improved varieties.
(ii) Variety, cultural and fertilizer investigations.
(iii) Investigations on the control of insect pests and diseases of these crops.

(d) Fibre Crops

(1) *Cotton*

There is an urgent need to extend the cultivation of Cotton in this country in order to cater to the expanding local textile industry.

Cotton has up to now been grown as a rainfed crop under Chena conditions. While this type of cultivation has given good yields in years of favourable rainfall, the average yield expectation over a period of time is however poor—namely, approximately 3 cwt./acre. The services of a Russian Cotton Agronomist was obtained to demonstrate the economic techniques of cotton cultivation under rainfed conditions.

It is proposed to set up a Research Station in the Walawe Basin to work out the problems of the cultivation of irrigated crops other than rice, with special reference to cotton. This information will be required when the Walawe River Project is complete as it is contemplated that about about 19,000 acres in the project area alone will be cultivated under irrigated cotton and other rotation crops.

Initial experiments on cotton under irrigated conditions carried out by the department this year have been extremely promising. It is proposed to continue this series of experiments on irrigated cotton for the future in order to obtain the necessary information for the Walawe Cotton Project. The following lines of work are undertaken :—

(i) Introduction, testing and breeding of new cotton varieties.

(ii) Cultural, irrigation and fertilizer investigations.

(iii) Investigations on the control of pests and diseases of cotton.

(2) *Kenaf*

Current evidence indicates that Kenaf which is a promising jute substitute can be successfully grown on the reddish brown earths of the dry zone. More research on this crop is required and the programme of work is being extended.

(i) Variety, cultural and fertilizer trials.

(ii) Study of fibre quality.

(iii) Investigation on improvement of the viability of seed.

These investigations are being carried out at Maha Illuppallama. Fibre tests will be done in collaboration with the Ceylon Institute of Scientific and Industrial Research.

(e) Condiments

Garlic, Corriander, Fennel, Mustard, etc.

About 20 million rupees are spent annually on the import of these commodities which are commonly used in Ceylon. There appears to be possibilities of raising these crops in the dry zone areas of the Island and investigations have recently been initiated at the Rahangala Research Station to explore this possibility, specially as it is found that cultivators around this area appear to raise these crops on a very limited scale.

Lentil is another crop the cultivation of which is been investigated at Rahangala.

Lines of investigations are as follows :—

(i) Variety, cultural and fertilizer investigations.

(ii) Control of pests and diseases.

(*f*) Miscellaneous Crops

(1) *Tobacco*

Ceylon is now virtually self-sufficient in its requirements of Cigarette Tobacco. Future research on this crop will be directed towards improving the quality, yield and burning quality.

The demand for Beedi Tobacco has considerably increased in the last few years and consequent on this the research programme of Beedi Tobacco is being intensified. The programme centres round the testing and selection of varieties for adaptability to different regions of the country. The selection of suitable wrappers is also receiving attention.

The following lines of investigation are being undertaken :—

(i) Variety, cultural and fertilizer investigations.

(ii) Investigations on the control of pests and diseases of this crop.

(iii) Selection of suitable wrappers for the Beedi Industry.

(2) *Ginger and Turmeric*

The expansion of Ginger and Turmeric cultivation is restricted by the absence of suitable centres for the bulk processing of the raw products. Processing by individual cultivators has proved difficult and unpopular. It is necessary to develop suitable equipment and techniques for the economic processing of raw turmeric and ginger.

This programme of work is being carried out at Peradeniya.

Sugarcane

Research on this crop is being undertaken by the Sugarcane Corporation and the Department of Agriculture does not, therefore, propose to carry out any research on Sugarcane.

MINOR EXPORT CROPS

The prospects for a variety of minor export crops such as Coffee, Cocoa, Pepper, Cinnamon, Nutmeg, Cardamoms, Cloves, Citronella and Lemon grass are apparent from the attention that India is now paying to these crops. This Island has been long famous for its spice crops but these have received very little attention so far. However in Cocoa, Coffee and Lemon grass investigations have been going on for some years past and considerable data on varieties and control measures for pests and diseases are available. More research work is required in the development of the cultivation of these crops, on the following lines :—

(1) *Cocoa and Coffee*

Selection of varieties, investigation of suitable cultural methods, fertilisers and control of pest and diseases.

(2) *Pepper, Nutmeg, Cloves and Cardamoms*

(i) Survey of the problems of cultivation.

(ii) Varietal, cultural and fertilizer investigations.

(3) *Cinnamon, Citronella, Lemon Grass*

(i) Survey of the problems of cultivation.

(ii) Varietal, cultural and fertilizer investigations.

The work on minor export crops will be located at Kundasale, Walpita and Peradeniya in the mid-country wet-zone. Other locations for work on these crops in particular for Cinnamon and Cardamoms will be selected in the future.

BASIC INVESTIGATIONS

The following basic investigations are considered necessary for the development of settled systems of farming in the dry zone. These will be primarily centred at Maha Illuppallama and have to be taken up as long-term investigations as staff becomes available. However, some of these lines of work like investigations on the use of herbicides, and irrigation requirements of plants are intimately connected with the investigations on development of crops receiving high priority.

The lines of investigations proposed are as follows :—

(i) Investigation of problems and techniques of irrigation of crops other than rice on the reddish brown earths and Latosols.

(ii) Research on the mechanization of agriculture particularly in the dry zone has received very little attention. Research in this field is very urgently required. A unit has been set up at Maha Illuppalama for the testing, adaptation and design of agricultural equipment suitable for use in dry zone agriculture.

(iii) Investigations on the consumptive use of water by different crops. This work is being carried out by a team of departmental officers attached to the Mahaweli Ganga Diversion Project.

(iv) During the Maha rains surface disposal of water and drainage are important management problems. A study of these problems is necessary to develop suitable techniques of management.

(v) Investigations on crop residue management and maintenance of soil fertility with reference to organic matter content nitrogen and phosphorus status are being continued.

(vi) Investigations in the chemical control of weeds of dry zone crops including laboratory screening and field trials.

(vii) Investigations in the use of herbicides in the control of weeds in rice fields are being carried out at Maha Illuppallama and Peradeniya.

SPECIAL SERVICES

Central Analytical Laboratory

In order to eliminate the need for establishing analytical laboratories in various parts of the Island in different research and experiment stations and also to relieve Research Officers of the burdens of routine work it is proposed to establish a Central Analytical Laboratory at the Peradeniya Research Station. This Laboratory will handle all the chemical analysis of soils, fertilizers, food stuffs and plant materials for the various research officers of the department.

Crop Protection Service

The Crop Protection Service of the Department will be organized to achieve the following objectives :—

(i) Training extension staff in the identification and control of pests, diseases and weeds of crops and in the operation and maintenance of crop protection equipment.

(ii) Carrying out surveys of pests, diseases and weeds of crops.

(iii) Carrying out evaluations of damage from pests, diseases and weeds of crops.

(iv) Developing techniques for accurate forecasting of outbreaks of pests and diseases of crops.

The National Soil and Land Use Survey

A National Soil and Land Use Survey was commenced by the Land Use Division of the Department in 1958. Considerable progress has been made in this work. This Division has recently been transferred under the Ministry of Lands. Since an understanding of soils and patterns of land use is basic to agriculture, the Department will work in the closest colloboration with the organization responsible for the National Soil and Land Use Survey.

This organization is at present engaged in the investigations connected with the Mahaveli Diversion Project. This service should be preferably further strengthened to continue to give the country information on land use as new development schemes are being developed and information is sought by the Public and Private Sectors on land use. Alternatively a unit should be established in the department of agriculture to give the private sector the information required, for which, staff would become necessary.

ANNEXURE

Staff

The summarised programme of experiments set out above requires the extra staff in respect of Research Officers and auxilliary staff that are necessary to carry out the proposed plan of research for the next five years. In this connection it is relevant to mention that the present research set up is as follows:—

Research Officers

Number of Research Officers including the itemised posts in cadre at present	—	51
Number of Research Officers under training abroad	8	—
Number of Research Officers now working in Ceylon	28	—
Total number of Research Officers presently in the Department	—	36
Additional number of Research Officers required for the implementation of the five-year plan	—	31
Existing vacancies in the present cadre	—	15

The above table will show that 31 more Research Officers are required to implement the five-year programme of research. Of this additional staff, vacancies already exist for 15 Research Officers in the present cadre and these vacancies are expected to be filled shortly.

Considering the fact that, of the 36 Research Officers presently in the Department only 11 have received their training abroad, it is expected that a large number of these officers will go out for periods of three years each for their Post-Graduate training abroad during the next few years. In order to maintain the continuity of the same lines of research that are being done by the officers going abroad it is proposed that suitable Agricultural Graduates as Research Assistants should be available to work in these fields as and when the necessity arises. This has been envisaged in the number of Graduate Agricultural Instructors or Research Assistants requested below.

Research Assistants

The total number of Agricultural Instructors attached at present to the research staff as assistants is twenty five. For the implementation of the five-year plan 67 extra Research Assistants are required. A proposal has been put forward to the Treasury recently to establish a cadre of Research Assistants to be recruited on the same salary scale that obtains today for the recruitment of graduates as Agricultural Instructors to this Department. This cadre is expected to absorb many of the Agricultural Instructors who are now working in the Research Divisions and also to bring in for the future suitably qualified Assistants for research.

Laboratory Assistants and Laboratory Sub-Assistants

With the proposed appointment of thirty one more Research Officers the recruitment of ancillary staff in the form of Laboratory Assistants and Laboratory Sub-Assistants would be essential and it is expected that a minimum of thirty Laboratory Assistants and thirty Laboratory Sub-Assistants would be required.

Designation of Laboratory Assistants and Laboratory Sub-Assistants

According to the nature of the work that is being done by the Laboratory Assistants which involves assistance to Research Officers both in the Laboratory and in the field, the designation *Laboratory Assistant* is a misnomer. It is proposed that these officers be re-designated Technical Assistants and the present Laboratory Sub-Assistants as Technical Sub-Assistants.

Subsidiary Foodcrops

SUBSIDIARY FOODCROPS

THE quantity and value of the subsidiary food stuffs imported into Ceylon in 1964 is given below :—

	Commodity		*Quantity in (cwt.)*	*Value in Rs.*	
1.	Chillies (dried)		425,383	46,470,859	
2.	Red Onions (shallots)		140,517	2,822,228	
3.	Bombay Onions (large onions)		1,244,311	22,983,868	
4.	Potatoes		1,471,458	25,467,718	
5.	Pulses	Lentils	392,862	10,895,168	
		Chick Peas	370,856	9,630,088	
		Dhal	199,432	8,055,547	
		Green Gram	200,936	6,738,796	
		Edible Peas	141,808	3,758,784	
		Black Gram	52,178	2,230,163	
		Other Pulses	392,862	10,895,168	Total of Items 1–5
			1,750,934	52,203,714	Rs. 149,948,387
6.	Maize		79,731	1,495,634	
7.	Garlic		54,433	2,651,291	
8.	Ginger		1,847	332,289	
9.	Turmeric		27,530	1,884,541	
10.	Mustard		3,176	163,347	
11.	Coriander		115,554	4,218,033	
12.	Tamarind		44,560	1,225,968	
13.	Cumin Seed		29,639	3,931,854	
14.	Fennal Seed		17,914	1,389,787	
15.	Mathe Seed		18,240	616,298	
	Grand Total		5,425,227	167,857,429	

Source : Customs Returns.

It will be seen that the value of the imports of dried chillies, red onions, bombay onions, potatoes and pulses together constitute nearly 90 per cent. of the total value of the imports of subsidiary food stuffs.

It is clear, therefore, that in any programme for the local production of subsidiary food crops priority must be given to these crops if they have high potentialities for domestic production. On this basis the crops selected for immediate development are chillies (dried), red onions, bombay onions and potatoes. The present position regarding each of these crops and the conditions that should be established for stimulating increased production of these crops are discussed first as they illustrate the general problems that will have to be faced in any programme for the production of subsidiary crops.

2. **Chillies (dried).** The quantity and value of dried chillies imported to the Island during the period 1955 to 1964 are as follows :—

Year	*Quantity in cwt.*	*Value in Rupees*	*Cost per cwt. Rs. c.*
1955	283,000	26,595,000	93 97
1956	273,000	23,545,000	86 24
1957	283,000	30,695,000	108 46
1958	284,879	21,772,862	76 40
1959	316,475	24,619,312	77 90
1960	344,665	36,537,007	106 00
1961	340,086	32,902,310	96 00
1962	380,404	36,341,737	95 60
1963	343,253	37,864,294	110 31
1964	425,383	46,470,859	109 52

It will be seen that the quantity and value of dried chillies imported to the Island have shown a sharp increase from 1963 to 1964.

3. Over the years there has been much discussion and propaganda about making Ceylon self-sufficient in chillies. This propaganda, contrary to popular opinion, has not been altogether in vain. The extent under chillie cultivation has been increasing over the years and, according to recent figures published by the Department of Census and Statistics, there was in 1963 an extent of 39,000 acres under chillie, mostly under rainfed conditions. Even if we treat this figure as a rough estimate, it is not unreasonable to assume that there is a fair and expanding acreage under chillie. But the chillies produced from these cultivations have been absorbed largely by the green chillie market. It is therefore necessary to emphasise the fact that in planning for the production of chillies to offset imports, the problem is one of securing dried chillies rather than green chillies. It is in this respect that local production has been negligible. If purchases under the G. P. S. are a criterion of local production of dried chillies, the situation is indeed an unhappy one. In 1962/63, the purchases under the G. P. S. amounted to only 25 cwt. of dried chillies, while in 1963/64 the purchases rose to about 1,000 cwt. and in 1964/65 to 4,000 cwt. There has, however, been persistent representations from some of the chillie-growing districts that for one reason or another it has not been possible to sell dried chillies to the G. P. S.

4. The almost complete failure of local dried chillie production has even made some people feel that the effort is not worth pursuing. This is, however, to take an unduly pessimistic view based on a superficial assessment of the facts. There are good reasons for the failure of past efforts at growing chillies on a large scale. Programmes for the production of chillies were invariably organised in terms of Island-wide 'drives' in which 'targets' for production were fixed for each agricultural range in the country. Efforts to grow chillies on a large scale on Government farms also proved a failure because apart from other considerations a labour-intensive crop like chillies cannot be economically produced with the comparatively high rates of pay of Government monthly paid labour. The experience with paddy has shown that a sufficiently high guaranteed price acts as a great stimulant to local production. The benefits of such a guaranteed price for dried chillies (long pod varieties (Tuticorin type) Rs. 252 per cwt. and Vanni type varieties Rs. 196 per cwt.) came into operation in October, 1964. Prior to this the guaranteed price of Rs. 168 per cwt. for the long pod varieties had not proved sufficiently attractive for people to undertake the additional task of drying their chillies instead of selling them as green chillies. On the average, five lb. of green chillies are required to make one lb. of dry chillies. The market price of green chillies will therefore determine the extent to which producers will prefer to sell green or dried. The present guaranteed price is sufficiently high to induce production almost exclusively for a dried chillie market.

5. The efforts to grow chillies on the basis of Island-wide drives operated on the assumption that the conditions necessary for large-scale farming such as climate, soil type, water supply, cultivation skills and marketing were equally favourable over most parts of the Island and all that was required was an intensive and determined effort on the part of the agricultural extension services to stimulate cultivators into undertaking production. This was, of course, a basically erroneous assumption. As in most other crops the growing of chillies in one's home-garden and growing on the scale of large farming units are entirely different types of agricultural operations. The large-scale cultivation of chillies can be undertaken only in particular regions of the Island and only if certain facilities are provided. Even so, there are several virus diseases which attack chillie and can cause considerable loss of crop. Most of these virus diseases are transmitted by insects. There is no known method of controlling or preventing a virus disease but the incidence of the disease can be reduced by the use of varieties which are resistant to or tolerant of the disease and by insecticidal control of the insects transmitting the disease. In both respects, research work is being

continued by the Department of Agriculture with a view to developing better varieties and better techniques of controlling these disease Even with the present varieties and techniques of pest control, th disease hazards can be minimised to render chillie cultivation unde reasonable conditions of management an economic proposition.

6. Generally speaking, chillies can be grown on relatively deep well drained soils of the dry zone under rainfed conditions during the Mah season. This cultivation, of course, carries with it the natural risk associated with the unpredictability and great variability of the Mah season rains. On the other hand, if there is an assured supply water, the cultivation of chillie will prove profitable and will b undertaken on a regular and sustained basis throughout the year. I other words, the provision of irrigation facilities for chillie cultivatio in those areas best suited for it is an indispensable facility withou which efforts at increasing domestic production of chillie may alway be in vain. The nature and scope of the irrigation facilities that ar required for the cultivation of chillies will be specified in th subsequent parts of this discussion.

7. At present, the production of chillie intended for purchase dried chillies under the enhanced guaranteed price has been organise by the Department of Agriculture in the following districts :—

Jaffna
Vavuniya
Mannar
Puttalam
Anuradhapura
Polonnaruwa
Trincomalee
Matale North
Kurunegala North
Amparai
Moneragala
Hambantota

and the dry zone divisions of the Kandy, Badulla and Ratnapur districts.

8. Except in Jaffna and Vavuniya, where there are about 1,900 acre of lift-irrigated chillies, the rest of the cultivations amounting t about 22,792 acres are largely rainfed and fall on the chenas and home

gardens. The extents under chillie cultivation in the dry zone in 1963-64 as estimated by District Agricultural Officers is given in the following table :—

District	*Chillie Extent in Acres*		*Total Extent in Acres*
	Maha 1963-64	*Yala 1964*	
Jaffna	1,187	274	1,461
Vavuniya	559	601	1,160
Mannar	160	—	160
Anuradhapura	2,568	462	3,030
Polonnaruwa	600	200	800
Matale	1,610	1,356	2,966
Ratnapura	3,112	432	3,544
Kurunegala	1,348	892	2,240
Puttalam	394	253	647
Hambantota	2,821	495	3,316
Moneragala	2,714	270	2,984
Amparai	229	255	484
	17,302	5,490	22,792

It would be completely unrealistic to think that chillie production can be expanded at the required speed and in the required quantities by relying exclusively on rainfed cultivations in chenas and home-gardens. The solution therefore lies in providing irrigation in those areas best suited for this crop. If this is done chillie cultivation will establish itself as a system of settled farming in which not only chillies but also a variety of other subsidiary crops can be grown in a system of rotation.

9. Since the availability of irrigated land in areas most suitable for chillie cultivation is the central problem, it is necessary to estimate even approximately the extent of such land that will be required to effect a major reduction in the imports of dried chillies.

10. Assuming that an average yield of 10 cwt. of dried chillie can be obtained from an acre of irrigated land, there will have to be 40,000 acres of irrigated land to produce the 400,000 cwt. of dried chillies that was imported to the country in 1964.

11. There is in fact a considerable extent of such land available for cultivation in areas suitable for chillie. A part of this land falls within the Government colonisation schemes while the rest falls outside. There is an extent of about 70,000 acres of highland in the major colonisation schemes of the dry zone. It can be expected that of this extent an acreage ranging from 10-20,000 is suitable for cultivation

in chillies if a regular supply of water is provided. No proper survey has been made of the extent of land lying outside the major colonisation schemes of the dry zone which could be utilised for regular chillie cultivation under irrigated conditions, but in relation to the available land resources suitable for this crop, it is not unrealistic to estimate for a substantial acreage (at least 25,000 acres) being available for chillie cultivation under irrigation.

12. The data furnished in the following table gives a clear indication of the land resources available for development in districts specially suitable for cultivation of subsidiary food crops such as chillies, onions and bombay onions.

District	*Total land area (Acres)*	*Agricultural area (Acres)*	*Agricultural area as a percentage of the total area*
Jaffna	617,280	169,393	27·44
Mannar	612,800	42,720	6·97
Vavuniya	916,160	64,981	7·09
Anuradhapura	783,760	200,499	11·24
Polonnaruwa	841,072	95,864	11·40
Trincomalee	646,960	74,434	11·50
Puttalam	735,600	218,339	29·68
Amparai	737,707	120,857	16·38
Moneragala	1,763,080	83,041	4·71
Hambantota	640,800	156,843	24·48

13. It is necessary to emphasise the fact which has earlier been mentioned in this paper namely that chillie cultivation on a scale large enough to achieve self-sufficiency can be attempted successfully only if irrigation is provided for those lands suitable for growing chillies on a commercial scale. Hitherto irrigation has invariably meant gravity irrigation and the crop it served was almost exclusively paddy. This tradition must be broken if the cultivation of subsidiary food crops is to have any chance of developing into an extensive system of settled farming. For instance, both within and outside the colonisation schemes there is a strong case for the provision of lift irrigation from surface sources as well as from sources underground through the use of tube wells. Preliminary investigations conducted recently by a visiting team of Israeli Specialists which include a hydro-geologist indicate that there are sources of exploitable underground water near Kondachchi in Mannar district. Since the geological structure of this area of the Mannar district is similar to that of areas in the Puttalam and mainland regions of the Jaffna district, it is not unreasonable to hope that there will be exploitable underground water resources in this area of the dry zone.

The importance of lift irrigation has already been recognised by the establishment of a special unit for this type of work in the Irrigation Department. But concrete steps must be taken to translate these intentions into operative factors in the field. As a first step it is necessary to undertake an intensive investigation of the exploitable underground water resources in certain areas of the dry zone. While such investigations are under way, there must be established in several colonisation schemes, lift irrigation units for initiating the cultivation of chillies and other subsidiary food crops on highland allotments.

14. Mention must also be made of one other aspect pertaining to local chillie production which has not been referred to earlier, namely that of restricting imports even on a graduated basis. It is an arguable matter whether import restrictions should be introduced only after local production has reached certain standards or whether restrictions themselves act as a stimulant which pushes local production quickly to higher standards. In the case of eggs, tobacco and groundnut the ban on imports proved a decisive factor in stepping up local production to the level of self-sufficiency. Even though the situation of eggs and tobacco as against chillies cannot be compared because the latter is an essential ingredient of the diet of the poorer people, it would be advisable to consider introducing even limited restrictions in the volume of dried chillie imports. For this purpose, it is recommended that the value of dried chillies imported to the Island be restricted to the level that prevailed in 1963. A limited restriction of this nature is not likely to cause any real hardship to the consumer. On the other hand, it can assist substantially in stimulating local production of chillies exclusively for a dried chillie market.

Income from Dried Chillies

(i) Total cost of cultivation (excluding land rents) Rs. 1,616 per acre.

(ii) At an estimated yield of 10 cwt. of dried chillies per acre at Rs. 252 a cwt. the gross income would be Rs. 2,520 and the net income Rs. 904 per acre. This income is thrice that of paddy.

15. Red Onions—The import of red onions to the Island during the period 1955 to 1964 has been as follows :—

Year	*Quantity in cwts.*	*Value in Rs.*	*Cost per cwt. Rs. c.*
1955	8,000	112,000	14 00
1956	50,000	764,000	15 28
1957	2,000	15,000	7 50
1958	12,500	214,222	17 00
1959	43,366	574,431	13 00
1960	203,366	3,283,035	16 00
1961	211,968	2,861,411	13 00
1962	165,714	2,516,403	15 00
1963	152,799	1,797,169	11 76
1964	110,517	2,822,228	25 53

The country is already more or less self-sufficient in red onions. The current domestic consumption is about 600,000 cwt. a year. Of this amount, about 450,000 cwt. is produced locally and the balance imported from India at a cost in 1964 of Rs. 2.8 million. Even though the cost of Rs. 2.8 million was exactly Rs. 1 million more than the cost of imported red onions in 1963, namely Rs. 1.8 million, the quantity of onions imported in 1964 was only 110,500 cwt. compared to the quantity of 152,800 cwt. imported in 1963. In general, the import of red onions becomes necessary only during the months of November, December and January when onions cannot be grown very successfully in this country on account of the wet Maha season. The import of red onions can be completely eliminated within the next year if Multi-purpose Co-operative Societies and Unions are given an incentive to store surpluses from the September harvest and farmers have an incentive to produce onions during the off season. The incentive required to meet these two aspects has been agreed upon by the G. P. S. Advisory Committee and a recommendation made to Government that onions be purchased under the G. P. S. on a fixed schedule of monthly prices. This has been approved.

If Commissioner, Agrarian Services or the Co-operative Wholesale Establishment can make arrangements to store about 100,000 cwt from the September harvest the problem of storage can be solved to a great extent. 25 Stores 125′ × 30′ × 11′ are required to store this quantity from September to December. These stores can be used for other purpose durig January-August.

16. **Bombay Onions.**—The import of Bombay Onions to the Island during the period 1955 to 1964 has been as follows :—

Year	*Quantity in cwts.*	*Value in Rs.*	*Cost per cwt.*	
			Rs.	*c.*
1955	731,000	9,175,000	12	54
1956	679,000	12,181,000	17	92
1957	748,000	15,306,000	20	46
1958	1,359,328	17,469,528	13	00
1959	1,196,243	17,607,850	14	00
1960	1,242,000	18,544,050	15	00
1961	1,135,129	18,484,224	16	00
1962	1,404,884	17,230,745	12	30
1963	1,126,434	19,801,749	17	58
1964	1,244,311	22,983,868	18	47

The domestic cultivation of this crop in farmers' fields was first started in Yala 1964, when the Department of Agriculture carried out demonstration plots in cultivators' fields in about 12 districts in the dry zone. In all, about 38 acres were cultivated and yields of 3—4 tons per acre obtained. A loan of Rs. 200 per quarter acre is given for the cultivation of bombay onions and the Department of Agriculture supplies the seeds at Rs. 5 per lb. The guaranteed price for bombay onions at present is Rs. 32.48 per cwt, for bulbs of over a specified size. About 800 lb. of seed sufficient for about 100 acres were sold to cultivators by the Department of Agriculture for the Yala 1965 season. 445 cwt. were sold to the G. P. S. from this crop. Bombay onions show definite signs of becoming an important crop in the dry zone and the extension of this crop will receive special attention. It has been estimated that approximately 20,000 acres in bombay onions would be required to achieve self-sufficiency.

Income from Bombay Onions

(i) Total cost of cultivation (excluding land rents) Rs. 2,552 per acre.

(ii) At an estimated yield of 4 tons at Rs. 32.48 a cwt. the gross income would be Rs. 2,598.

An increase in the present G. P. S. price will be necessary as an incentive to expand the acreage. This will be reviewed by the G. P. S. Advisory Committee shortly.

17. **Pulses.**—The problems of achieving self-sufficiency in pulses are greater than with the other subsidiary food crops. Firstly the cultivated area annually required for self-sufficiency in all pulses is large and in the region of 150—175,000 acres. Secondly only a few of the pulses that are imported have so far been successfully grown in

Ceylon. For instance it has been difficult to obtain satisfactory crops of lentils (Lens esculenta) except is restricted areas of the country and Bengal Gram, Chick Peas (Cicer arietinum) does not appear to be suited to the Ceylon climate. Thirdly the expanded production of pulses is linked as in the case of other subsidiary crops with the establishment of settled farming.

Green Gram and Black Gram which are traditional chena crops can be included as rotational crops on irrigated lands along with chillies and onions. There is also scope for extending the area under these crops in rotation with rice in paddy fields.

Cow Peas can be used as direct substitutes for Lentils and varieties are now available in Ceylon which are being multiplied for distribution to cultivators. The cultivation of this crop in rotation with other crops on irrigated and unirrigated farms can make a significant contribution towards solving the problem.

Tur Dhal (Pigeon Pea) can also be grown both as a rainfed and irrigated crop in the dry zone as component of a rotation with other crops. There are however technical problems associated with the control of pod-borers which have not yet been completely solved.

Clearly there is a strong case for intensifying research on the production of pulses in this country. At the present G. P. S. prices, there is no profit in growing pulses. Increases in these prices will be necessary to expand production. This will be reviewed by the G. P. S. Advisory Committee shortly.

18. **Maize and Sorghum.**—It is technically feasible to cultivate both maize and sorghum as rainfed crops in systems of mixed farming under mechanised conditions in the dry zone of Ceylon. The economic feasibility of such systems of mixed farming are yet to be established and it is proposed that a pilot project for the cultivation of maize and sorghum be established for this purpose. Pulses and oil seeds, such as gingelly (Sesame) and groundnut can also be included in the rotations.

19. **Potatoes.**—Import of potatoes to the Island during the period 1955-1964 has been as follows:—

Year	Quantity in cwt.	Value in Rs.	Cost per cwt.	
			Rs.	c.
1955	798,000	13,130,000	16	45
1956	607,000	13,195,000	21	73
1957	722,000	15,382,000	21	30
1958	865,000	16,627,000	19	22
1959	944,000	17,816,000	17	80
1960	1,115,000	19,169,000	17	19
1961	1,187,000	20,496,000	17	20
1962	1,098,000	22,233,000	20	20
1963	1,368,000	26,075,000	19	00
1964	1,471,000	25,461,000	17	23

Research and extension programmes in potatoes are in progress in selected areas of the country. Trials carried out in different areas of the Island have indicated that potatoes can be grown successfully at elevations of over 3,000 feet and in the light soils of the dry zone. Present indications are that the highest potential for the development of this crop exists in the well drained paddy fields of Udukinda and Medikinda divisions of Badulla district as a yala crop soon after the maha paddy crop has been harvested. Encouraging results have been obtained in the Jaffna Peninsula as a maha crop, where average yields of 5 tons per acre have been obtained by several cultivators. 200 acres of potatoes have been grown this year by cultivators in both areas.

20. **Turmeric.**—This is a very easy crop to grow in the districts of Matara, Galle, Kalutara, Colombo, Ratnapura, Kegalle, Kandy and parts of Kurunegala. But the difficulty is the trouble of curing and drying. This cannot be done with large machinery as the harvesting period is restricted to 3 months of the year. This is essentially a cottage industry to be done by the rural organisations and school children. The cured product will be purchased at the guaranteed price of Rs. 84 per cwt. Cultivation of this crop in school gardens in the above mentioned districts will be undertaken from Yala 1966.

21. **Garlic, Corriander, Cumin, Fennel and Mathe Seed.**—Trials in cultivators fields will be undertaken with these crops in suitable areas of the country.

22. In paragraph 10 it was stated that 40,000 acres of irrigated land would be required for producing the 400,000 cwts. of dried chillies that were imported to the country in 1964. It has also been pointed out that it will be possible to grow a wide range of subsidiary food crops in rotation with chillies on the 40,000 acres. This extent of irrigated land will be sufficient for the production of our requirements of onions and groundnuts and a part of our requirements of pulses such as green gram, black gram, cowpea and tur-dhal.

23. It is proposed to bring approximately 40,000 acres of irrigated land under subsidiary food crops in the next five-years. The allocation of these lands under the various schemes proposed in this memorandum is as follows :—

1. **Programme for provision of irrigation facilities to areas selected for cultivation of subsidiary food crops**

   (a) *Lift Irrigation from surface sources*

   (i) Highland allotments of existing Colonisation Schemes :

Scheme		*Highland lots* *Acres*	
1. Pavatkulam	RB	200	
2. Morawewa	LB	400	
3. Minipe	Old	800	
	Extension	300	
4. Mahakanadarawa	LB	700	
5. Padaviya		500	
6. Rajangana	RB	900	
	LB	600	
7. Akkarayankulam	LB	150	
	RB	150	
8. Vavunikulam	RB	550	
	LB	800	
	Centre	100	
9. Usgala Siyamalangamuwa	RB	50	
10. Hakwatuna Oya	RB	450	
	LB	150	
11. Giritale	RB	400	
12. Mahawillachchiya	RB	200	
	LB	170	
13. Iranamaduwa	RB	350	
14. Etimole Wewa	LB	200	
15. P. S. S. Sluice		350	
16. Other Schemes		1,530	
			10,000

   (ii) Youth Settlement Schemes :

(*a*) Gal Oya	LB	3,000	
(*b*) Wellangiriya		1,200	
(*c*) Hiriyala		800	
			5,000

(*b*) *Lift irrigation from underground water sources*	5,000

2. **Gravity irrigation under tank schemes**

   (*a*) *Major Schemes*

(i) Visvamadukulam	1,200	
(ii) Muttayankattukulam	12,000	
(iii) Vavunikulam (anicut scheme)	2,000	
		15,200
(*b*) *Minor Schemes*		5,000
		40,000

24. A separate memorandum is being prepared by the Irrigation Department estimating the costs of the lift irrigation equipment and surveys that will be necessary for undertaking the programmes briefly referred to above. In view of this no cost estimates of the proposed irrigation facilities are included in this paper.

25. The fertilizer requirements for the subsidiary food crops programme have been taken into account in the fertilizer estimates of the Chairman, Fertilizer Corporation which is also being submitted.

Chillies and Onions will require the following fertilizers :—

	1966 *5,000 acres*	*1967* *10,000 acres*	*1968* *20,000 acres*	*1969* *30,000 acres*	*1970* *40,000 acres*
Concentrated Super Phosphate..	250 tons ..	500 tons ..	1,000 tons ..	1,500 tons ..	2,000 tons
Muriate of Potash ..	125 ..	250 ..	500 ..	750 ..	1,000
Sulphate of Amonia	500 ..	1,000 ..	2,000 ..	3,000 ..	4,000

26. The requirements of machinery, agro-chemicals and spraying equipment are as follows :—

	1966	*1967*	*1968*	*1969*	*1970*
Machinery—					
Medium Sized Tractors ..	100 ..	200 ..	400 ..	600 ..	800
Walkie Tractors ..	200 ..	400 ..	800 ..	1,200 ..	1,600
Spraying Equipment—					
Hand Operated Sprayers ..	500 ..	1,000 ..	2,000 ..	3,000 ..	4,000
Agro-chemicals—					
(Pints) ..	5,000 ..	10,000 ..	20,000 ..	30,000 ..	40,000
Sprinkler Units ..	20 ..	40 ..	80 ..	120 ..	160

27. Local private enterprise has come forward to grow Subsidiary Food Crops on a large scale. It is expected that about 5,000 acres will be brought under mechanised farming and lift irrigation during the next five-years through private enterprise to graw Subsidiary Food Crops.

28. Staff.—The present Extension Staff cannot cope up with the extra work on Subsidiary Food Crops. Additional staff required is as follows :—

(*a*) Three Agricultural Officers (Temporary) to be stationed at Anuradhapura, Kurunegala and Amparai,

(*b*) Eighteen Agricultural Instructors to be distributed as follows :—

Jaffna District	2
Vavuniya	2
Anuradhapura	3
Kurunegala	2
Polonnaruwa	1
Trincomalee	1
Amparai	2
Moneragala	2
Badulla	1
Hambantota	1
Kandy	1
Total	18

(c) About 60 Food Production Overseers will also be required.

Storage Requirements under the G.P.S. and for Distribution of Foodstuffs

26. Staff.—The present [illegible] Staff cannot cope with the same work on Subsidiary Food Crops. Additional staff required is as follows:—

(a) [illegible] Assistants, Investigators and [illegible]

(b) Subject [illegible] Agricultural [illegible]

[illegible]

(c) [illegible] for Food Production [illegible] can be [illegible]

STORAGE REQUIREMENTS UNDER THE GUARANTEED PRICE SCHEME AND FOR DISTRIBUTION OF FOODSTUFFS

PRICE support for agriculture has been the accepted policy of Government for more than 15 years and has been embodied in the Agricultural Products (Guaranteed Prices for Hulling & Milling) Act No. 33 of 1961. Government has offered guaranteed prices and assured markets to primary producers of 19 selected items of local agricultural products such as paddy, maize, chillies, onions, potatoes, green gram, coffee, etc. The price guarantee is implemented through a network of 4,500 Multi-Purpose Co-operative Societies which are appointed authorised purchasers to accept produce from bona fide producers in all areas. These Societies operate at village level. They hand over the produce collected by them to the G. P. S. Stores established by Government in all districts. One of the main impediments to the effective operation of the Guaranteed Price Scheme has been the lack of adequate storage for produce offered both at village level and at district level where Government accepts produce at G. P. S. Stores. Producers have, in the past, complained of inability to hand over paddy soon after harvest to Co-operative Societies owing to lack of storage accommodation at the Purchasing Centres of the Societies. Societies were in turn unable to deliver their collections regularly at the G. P. S. Stores of the Department owing to congestion during the purchasing season. The consequent delay in purchases resulted in producers being driven to traders and middlemen who exploited them by purchasing their paddy at reduced prices.

2. The following Table gives the total production, the purchases under the G. P. S. and the storage available during the last 7 years :—

TABLE I

Year	*Total Production* (*Million bushels*)	*Purchases under G. P. S.* (*Million bushels*)	*Percentage of Purchases on Production*	*Storage available* (*Million bushels*)
1958	36·6	13·2	36·1	4·2
1959	36·4	16·2	44·5	5·0
1960	41·0	20·8	50·7	7·0
1961	43·1	22·4	51·9	7·1
1962	48·0	27·0	56·2	7·8
1963	49·1	27·7	56·4	12·0
1964	50·5	29·7	58·8	13·1

Despite the additional storage provided from year to year congestion was experienced annually immediately after harvest when producers clamoured to deliver their paddy to Societies expeditiously. In order to cope with this situation a crash programme for the rapid construction of pre-fabricated stores with 4 million bushel capacity at a cost of Rs. 5.8 million was approved for G. P. S. and Rs. 4 million for the Food Department.

These Stores were completed in 1963 and they helped to ease the storage congestion. With the increase of storage, however, the pace of paddy deliveries has been accelerated and a larger proportion of the harvest was surrendered under the Guaranteed Price Scheme as will be seen from Table I above.

3. The most essential requirement to implement the Price Guarantee is the provision of paddy storage accommodation. Storage needs have to be based mainly on the estimated quantities expected under the Guaranteed Price Scheme during the major season. In a successful Maha season the production is approximately 34 million bushels and the quantity offered to Government under the Guaranteed Price Scheme is approximately 24 million bushels. Taking into account the milling capacity available in the areas, it is estimated that the optimum storage should be equal to two-thirds the purchasable surplus from the major harvest. In Table II below are set out the estimated production for the next 5 years, the purchasable surplus and the optimum storage.

TABLE II

Year	*Paddy Production (Million bushels)*	*Production in Maha (Million bushels)*	*Purchasable Surplus (Million bushels*	*Optimum Storage (Million bushels)*	*Further Storage required (Million bushels)*
1966	53·5	34·5	24	16	2
1967	57	37	26·5	17	1
1968	61	40	28	18	1
1969	66	44	30	19	1
1970	70	47	32	20	1

The present storage is 13.1 million bushels and with the programme under construction the storage available at the end of this year will be 14 million bushels. The total storage required during the Five-Year period for the Guaranteed Price Scheme amounts to 6 million bushels —Vide Annexe I. To this must be added village level Stores required by the Multi-purpose Co-operative Societies which function as authorised purchasers. As the majority of these Societies do not possess even a minimum storage, it is necessary to grant loans and equip them with stores up to at least 3 million bushels during the 5-year period. These Stores will be required not only for use as paddy stores, but also to stock the large quantities of red onions, dried chillies, maize, potatoes, Bombay onions, and other foodstuffs which are being planned for production on a large scale during the ensuing 5-year period.

There are two types of Stores already in use, one built of brick walls, asbestos roofs and the other is of Prefabricated Cosely type structures imported and installed in different areas. While the latter can be set up more expeditiously it would involve a larger component of foreign exchange. For the entire requirement of 9 million bushels, the floor area of the stores would be 900,000 sq. ft. at an average cost of Rs. 15 per sq. ft. including drains, fencing and internal roadways. The total cost of the entire programme would be Rs. 13.5 million, of which Rs. 7.5 million is estimated to be foreign exchange required for importation of pre-fabrications.

5. In the event of brick buildings being set up, the total cost would be Rs. 18 million of which the foreign exchange component should not exceed Rs. 4 million. This type of construction, however, will take a longer time and the programme cannot be completed within the planned period under existing requirements to entrust the work to Co-operative Societies which are not fully equipped to undertake this type of work. The phasing of the construction will be as shown in Table III below :

TABLE III

Year	*Government G. P. S. Stores (Million bushels)*	*Stores for Co-operatives (Million bushels)*
1966	·5	·5
1967	1·0	·5
1968	1·5	·5
1969	1·5	·75
1970	1·5	·75
	6·0	3·0 i.e. 900,000 sq.ft.

	Prefabricated	*Brick buildings*
(1) Total Cost	Rs. 13·5millions	Rs. 18millions
(2) Foreign Exchange Component	„ 7·5 „	„ 4 „
(3) Local Expenditure	„ 6·0 „	„ 14 „

Storage for Distribution of Foodstuffs

6. The Food Commissioner operates the Rice Rationing Scheme which makes available to individual consumers in their own areas

their weekly ration of rice. In each district Supply Stations are maintained by the Deputy Food Commissioners to stock the weekly requirements of rice and flour under the Rationing Scheme. From these Supply Stations issues are made weekly to Co-operative Wholesale Unions which in turn issues to retailers the requirements of the consumers. At present some of the District Supply Stations have inadequate storage accommodation even for a fortnight's consumption requirements. In surplus paddy producing areas where milling of local paddy is effected, the lack of accommodation at the Supply Station has slowed down the pace of milling thereby creating congestion in the paddy stores. The total quantity of paddy collected under the Guaranteed Price Scheme has increased from year to year and correspondingly the quantity of local rice delivered to the Food Commissioner has increased as follows:—

TABLE IV

Year	*Tons*
1958	209,037
1959	245,054
1960	285,000
1961	342,600
1962	368,854
1963	398,416
1964	416,000

It is absolutely necessary to increase the storage accommodation available for rice at the District Supply Station. This will not only enable the benefits of the Guaranteed Price Scheme to reach a large majority of producers, but also help to channel an increasing proportion of local rice into the Rationing Scheme. Increased storage accommodation is required in the following places :—

	Sq. ft.
Kandy	50,000
Ratnapura	40,000
Badulla	25,000
Anuradhapura	30,000
Kurunegala	30,000
Trincomalee (Mutur)	10,000
Polonnaruwa	30,000
Amparai	25,000
Matale	15,000
Moneragala	10,000
Other places	35,000
	300,000

Total estimated cost Rs. 5 million.

Some of the Stores now rented out by the Department are unsuitable for storage and provision has been made for their replacement.

Programme for the construction of Food Stores at Discharge Ports

7. The total requirement of rice under the Rice Rationing Scheme is approximately 950,000 tons. Annually, the Commissioner of Agrarian Services makes available to the Food Commissioner about 400,000 tons of rice and the balance 550,000 tons is therefore imported.

In addition to this, the Food Department also imports the Island's total requirements of sugar and flour. These imports which amount to approximately 1.2 million tons a year are discharged at the port of Colombo and the outports of Galle, Trincomalee and Jaffna. About 80 per cent of the shipments are discharged in Colombo where the Food Department has storage accommodation for 115,000 tons. The accommodation available has been found to be very inadequate and, as a result, the discharge of food ships in the Port has been adversely affected and the Department has had to pay a heavy demurrage bill on chartered food vessels. The demurrage bill of the Department for the year 1963-64 was approximately 5.5 million rupees. In view of this situation, arrangements have been made for the construction of additional storage accommodation in Colombo to accommodate approximately 60,000 tons of food cargo at a cost of approximately 6.5 million rupees. Plans have already been made for the construction of stores up to 40,000 tons (240,000 sq. ft.) at a cost of approximately 4.3 million rupees. Additional stores to accommodate 20,000 tons (120,000 sq. ft.) are urgently required and the estimated cost of these stores is approximately 2.2 million rupees.

In addition to the immediate requirements of storage accomodation listed above, it will be necessary to construct additional stores in Colombo for approximately 10,000 tons annualy to take in the increasing volume of imports. During the period 1967-1970, additional stores to accommodate 40,000 tons of cargo will be required and the approximate cost will be 4.3 million rupees. This represents 240,000 sq. ft. of store space.

Food cargo discharged in the port of Galle is used for distribution under the rationing scheme in the Southern Province. At present due to draft requirements ships partly discharged in Colombo are diverted to Galle. But the Port Commission is at present constructing an alongside quay and it has been decided to allocate one berth alongside for the discharge of food cargo. This would mean that the rate of discharge will increase considerably and, to take full advantage of this facility, it would be necessary for the Department to have, at its disposal, adequate store accommodation. The Boosa District Granary which is used for the receipt of food cargo discharged at the Port of Galle, has a total capacity of 12,000 tons. It is estimated that additional storage accommodation for about 15,000 tons would be required at Galle by the time the construction of the quay by the Port Commission is completed. To accommodate 15,000 tons it would be necessary to construct 90,000 sq. ft. of stores and the approximate cost of this construction would be 1.8 million rupees (brick building).

Of the 2 other Outports the present accommodation available at Trincomalee, which is approximately 35,000 tons is considered adequate Accommodation at Jaffna however is restricted to approximately 12,000 tons at the Navatkuli District Granary and Jaffna Supply Station. These stores at Jaffna are meant for the receipt of cargo discharged at the ports of Jaffna and Kankesanturai. Jaffna and Kankesanturai are seasonal ports and ships are discharged at Kankesanturai from April to October and at Jaffna from November to March. The Port Commission has finalised plans for the construction of a harbour at Kankesanturai and it would be possible after the construction of this harbour to use Kankesanturai as an all-weather Port. The store accommodation at Jaffna will therefore have to be increased considerably as alongside discharge will be possible after construction of this harbour. It is estimated that additional store accommodation for about 10,000 tons would be required at Jaffna at a total cost of 1.2 million rupees (brick building).

The following is a summary of the programme of stores construction for the Food Department at Discharge ports during the period 1966 to 1970 :

	Rs.
Colombo—100,000 tons—600,000 sq. ft. for prefab at Rs. 18.00 sq. ft. ..	10·8 M
Galle—15,000 tons—90,000 sq. ft. (Brick)	1·8 M
Jaffna—10,000 tons—60,000 sq. ft. (Brick)	1·2 M
Total—125,000 tons—750,000 sq. ft.	13·8 M

This programme will be implemented as follows :—

	Colombo	*Galle*	*Jaffna*	*Other Districts (sq. ft.)*	*Expenditure*
					Rs.
1966	240,000	—	—	—	4·32 M
1967	120,000	20,000	—	50,000	3·56 M
1968	80,000	20,000	15,000	80,000	3·74 M
1969	80,000	20,000	20,000	80,000	3·84 M
1970	80,000	30,000	25,000	90,000	4·34 M
	600,000	90,000	60,000	300,000	19·8 M

Prevention of Infestation of Stocks

8. The design and construction of stores hitherto being used had not provided for preventing damage and deterioration of grains in store. It is therefore proposed to alter the design and construction of floors and walls so as to prevent damage by rodents, capillary action and enable sufficient areation to take place when the stores remain closed. Periodically the stores will also be fumigated and spraying of chemicals will be done to prevent insect infestation. Experience has shown the need to pay attention to these essential requirements as the damage to stocks from these causes may vary from 2 per cent to 5 per cent. Visiting experts from the F.A.O. have made recommendations to obtain the services of Stores Product Specialists and train local teams in the techniques of fumigation and gas proof sheets and spray chemicals for treatment of go-downs in the Port areas as well as in the District Supply Stations and Paddy Stores.

Transport

9. The marketing of paddy and other guaranteed price products as well as the distribution scheme involves the transfer of stocks from remote producing areas to Government go-downs at District Headquarters and in urban areas. One of the difficulties encountered in the effective operation of both the Guaranteed Price Scheme and the Food Distribution Scheme is the lack of adequate road transport

for the transport and handling of produce has resulted in breakdown of services and emergency arrangements having to be made on occasions. The chief areas where transport has been found difficult are:

- Amparai District
- Polonnaruwa District
- Anuradhapura District
- Hambantota District
- Moneragala District
- Ratnapura District

The Food Department has at present a fleet of 198 lorries for the transport of food cargo from the Port of Colombo. In addition to these lorries the services of private transport contractors are also utilised by the Department for this work. The inadequacy of transport has been one of the factors that has adversely affected the expeditious discharge of food ships in the port. In view of this, approval has been obtained for the immediate purchase of an additional 50 lorries for the Food Department. In addition to this, it would be necessary for the Department to augment its present fleet with at least 100 lorries and/or tractor-trailors during the next five years. The total cost of the 100 vehicles would be approximately 3 million rupees.

The Department has at present a repair workshop at Chalmers Granaries the main Food Stores in Colombo. The store premises is also used as the parking area for these lorries. The workshop itself is housed in a 100 × 50 prefabricated building. With a fleet of 200 lorries there is about 30 to 35 lorries on an average garaged for repairs at any given time. It has been found that the accommodation available in the building used is hardly sufficient to take in so large a number and, as a result of this congestion work at the repair workshop has been adversely affected. Furthermore, since the granaries is the main issue point for rice and flour and also the point from which outstation requirements are despatched by rail, the arrangement for the use of these premises as the parking area for the departmental lorries is very unsatisfactory. It is therefore proposed to construct a larger building of at least 10,000 sq. ft. for the repair workshop with adequate space for a larger parking area for the departmental vehicles. From the security point of view also a separate premises for the workshop and the garage is considered absolutely essential. It has however been found that no suitable Crown land is available in Colombo for this purpose. It is therefore proposed to acquire a suitable private land of about 2½ to 3 acres in extent and to construct the garage in that premises. The approximate cost of the land, the construction of a prefabricated building of 10,000 sq. ft. requirement would be Rs. 500,000.

Milling

10. About 30 million bushels of paddy are collected annually under the Guaranteed Price Scheme. This paddy is converted into rice at 15 Government Mills and Hulling Plants and 970 private mills and hulling plants which have been registered with the Department of Agrarian Services for milling on a hire basis. Government mills have a maximum capacity of 3.5 million bushels and the balance 27 million bushels is issued to private mills weekly and the rice is delivered by the millers to the Food Commissioner's Supply Stations. 80 per cent. of the rice is milled after parboiling the paddy, the balance 20 per cent. is milled raw. For many years most of the private mills were concentrated in certain areas, such as Matara, Kurunegala, Jaffna and Colombo, while there was a grave shortage of mills in paddy producing areas such as Polonnaruwa, Amparai, Trincomalee, Badulla, Kegalle and Matale. Consequently, paddy had to be transported over long distances at considerable expense for the purpose of milling. With the increase in the paddy collections under the Guaranteed Price Scheme, there was a pressing need to increase the milling capacity in the producing areas. This has been done by setting up Government Mills giving assistance to Co-operatives to set up mills in deficit areas and registering private mills where milling capacity was found to be inadequate to cope with the milling of paddy available in the area. At present the transport of paddy for the purpose of milling is reduced to the minimum and each district has more or less adequate milling capacity for the paddy collected in the district.

While attention was paid hitherto to the need to instal additional milling capacity wherever required, little progress was made in improving the standard of rice produced or in the various stages of processing and trying and the use of by-products. An F.A.O. Advisor examined those aspects of the problem in 1954-55 and made F.A.O. Report No. 429 in November, 1955, recommending :—

(a) the setting up of a private plant for classical milling and improved methods of parboiling ;

(b) replacement of milling plants with mills of classical type ;

(c) introducing suitable rice processing and drying machinery.

In pursuance of these recommendations an application was made to the United Nations Special Fund for the establishment of a Centre for rice processing with a private plant for operation. This project was not accepted, but the urgency of improving the standards of milling in the country conserving the damage to grains which arise both in storage and in the course of milling continues to remain during the 5-Year period. It is therefore proposed to arrange for an up-to-date 'Classical' type mill of sound construction to be set up and worked in a paddy producing area to serve as a model demonstration centre for production of improved quantity of rice. This will have to be equipped with laboratory and training facilities for the testing of grains and setting up standards of quality of milled rice.

The financial costs of the scheme are as follows :—

	Rs.
(i) *Capital Expenditure :*	
Cost of classical type mill for installation in a producing area ..	600,000
Cost of mill house, Stores and quarters	500,000
Laboratory equipment and training facilities at one mill ..	400,000
	1,500,000

(ii) *Recurrent Expenditure :*

Cost of staff per month ..	Manager Storekeepers Clerks Foremen Mechanics, etc., at Rs. 7,500 p.m.	Rs. 45,000
Specialists—Mill Engineer Rice Technologist and Proboiling Expert	To be obtained under Colombo Plan or other Aid Scheme	

Crown land is available in most places for the construction of buildings in the areas indicated under this Programme. Provision has been made for acquisition of suitable sites in other places.

Purchase of Paddy by Weight

11. Paddy is the only commodity that is still handled by volume in Ceylon. Other commodities are purchased by weight under the Guaranteed Price Scheme. Rice distributed on the ration used to be issued by volume until about 1958 when Government switched over to issue of rations by weight. The international standards adopted for paddy and rice is by weight. The question of fixing the guaranteed price for paddy by weight and of issuing paddy to millers and taking over the rice produced by them also in weight was examined previously, but a decision to implement the adoption of weight was

not taken as it involved substantial foreign exchange for the purpose of purchasing and equipping all G.P.S. Stores, Co-operative Societies and mills with the necessary weighing scales. This change-over has the following advantage :—

(a) The entire process from the point of purchase up to milling and issue to consumers will be uniform. This will avoid opportunities for abuse and corrupt practices. It will also eliminate the need to convert the volume of rice taken-over from millers into corresponding weight.

(b) Measurement by weight allows less scope for variation when taking over paddy or rice than measurement by volume. The manual process of measuring paddy results in abuses arising from personal factors.

(c) Handling paddy and rice by weight is in conformity with international practice and would enable production, storage and consumption figures to be readily compared with the figures from other countries.

The estimated cost will be as follows:—

	Each *Rs.*	*Rs.*
2,500 Co-operative Societies at ..	1,500 ..	3,750,000
2,000 Co-operative Societies at ..	875 ..	1,750,000
250 G.P.S. Stores, 2 each at	2,000 ..	1,000,000
1,000 Mills	1,000 ..	1,000,000
		7,500,000

12. The following is a summary of the program:—

	Rs. million	*Rs. million*	*Rs. million*
(i) *Storage for G.P.S.*—900,000 sq. ft.—			
450,000 sq. ft. prefabricated :			
Local expenditure	3·0		
Foreign exchange	3·75		
		6·75	
450,000 sq. ft. brick buildings :			
Local expenditure	8·0		
Foreign exchange	1·0		
		9·00	
			15·75

(ii) *Storage of rice and buffer stocks at Discharge Ports* 1,050,000 *sq. ft.*

600,000 sq. ft. prefabricated

Local expenditure	Rs. 4·8 million		
Foreign exchange	Rs. 6·0 million	10·8 million	

450,000 sq. ft. brick buildings

Local expenditure	Rs. 8·0 million		
Foreign exchange	Rs. 1·0 million	9 million	.. Rs. 19·8 M

(iii) *Estimate for fumigation and chemical spraying to prevent infestation* .. Rs. ·1 M

(iv) *Transport Fleet*

Local expenditure	Rs. 1·0 million	
Foreign exchange	Rs. 2·0 million	.. Rs. 3·0 M

(v) *Rice Mills Programme*

Local expenditure	Rs. ·5 million	
Foreign exchange	Rs. 1·0 million	.. Rs. 1·5 M

(vi) *Weighing Machines* .. Rs. 7·5 M

.. Rs. 47·65 M

SUMMARY OF EXPENDITURE

	Local Expenditure	*Foreign Expenditure*	*Total*
	Rs. million	*Rs. million*	*Rs. million*
(*a*) G. P. .S. Stores	11	4·75	15·75
(*b*) F. C. Stores	12·8	7	19·8
(*c*) Fumigation	—	·1	·1
(*d*) Transport	1	2·0	3·0
(*e*) Milling	·5	1·0	1·5
(*f*) Weighing Machines	·5	7·0	7·5
	25·6	21·85	47·65

G.P.S. STORAGE REQUIREMENTS—FIVE-YEAR PROGRAMME—1966–70

District	Acreage Maha 1963–64	Harvested Yala 1964	1963–64 Total	Production 1963–64			Existing Storage (in bushels)	Further Requirements (in bushels)
				Maha 1963–64 (bushels)	Yala 1964 (bushels)	Total		
1. Colombo	52,174	25,223	77,397	1,479,002	731,517	2,210,519	605,000	200,000
2. Kalutara	31,241	34,522	65,763	845,768	899,345	1,745,113	252,000	200,000
3. Kandy	44,850	34,837	79,687	1,961,402	1,327,481	3,288,883	525,000	700,000
4. Matale	22,199	13,975	36,174	829,299	452,580	1,281,879	410,000	200,000
5. Nuwara Eliya	16,968	9,961	26,929	826,185	386,511	1,212,696	—	100,000
6. Galle	32,977	39,864	72,841	819,890	939,275	1,759,165	200,000	300,000
7. Matara	29,986	40,860	70,846	951,980	1,231,908	2,183,888	170,000	200,000
8. Hambantota	29,683	32,789	62,472	966,330	1,228,538	2,194,868	500,000	100,000
9. Jaffna	71,800	10,629	82,429	1,718,659	332,384	2,051,043	445,000	300,000
10. Mannar	29,422	4,177	33,599	1,130,393	161,900	1,292,293	540,000	200,000
11. Vavuniya	47,461	3,757	51,218	1,512,819	143,449	1,656,268	645,000	200,000
12. Batticaloa	68,940	19,881	88,921	1,989,437	617,990	2,607,427	550,000	300,000
13. Amparai	76,426	53,925	130,351	2,401,648	1,746,361	4,148,009	1,495,000	200,000
14. Trincomalee	32,744	21,284	54,028	943,518	774,673	1,718,191	1,085,000	—
15. Kurunegala	143,839	57,289	201,128	4,230,304	1,781,286	6,011,590	905,000	900,000
16. Puttalam/Chilaw	23,398	4,125	27,523	680,179	110,797	790,976	170,000	200,000
17. Anuradhapura	90,730	37,514	128,244	3,115,668	1,272,606	4,388,274	2,180,000	200,000
18. Polonnaruwa	51,113	42,156	93,269	2,482,941	1,720,681	4,203,622	1,480,000	400,000
19. Badulla	16,759	19,190	35,949	723,653	839,552	1,563,205	100,000	300,000
20. Moneragala	13,841	3,573	17,414	687,067	136,970	824,037	380,000	200,000
21. Ratnapura	26,560	25,046	52,606	641,609	718,720	1,360,329	320,000	100,000
22. Kegalla	26,715	20,317	47,032	1,179,667	773,153	1,952,820	205,000	300,000
Total	979,826	554,894	1,534,720	32,117,418	18,327,677	50,445,095	13,162,000	6,000,000

The Expansion of Fertilizer Use

THE EXPANSION OF FERTILIZER USE

I. Estimated Consumption

1. The current level of fertilizer usage in Ceylon is as follows :—

Crop	*Acreage*	*Optimum dosage (average)*	*Optimum consumption in tons*	*Current consumption in tons*	*Current consumption as percentage of optimum (per cent.)*
Tea	558,300	7 cwts.	195,405	160,000	81·88
Rubber	660,000	90 lbs.	26,518	25,000	94·28
Coconut	1,150,000	3½cwts.	201,250	50,000	24·84
Paddy :					
1st Crop	1,105,000	3 „	165,750	51,350	20·34
2nd Crop	575,000	3 „	86,250		
Other Crops	n. a.	n. a.	n. a.	18,000	n. a.
Total	4,048,300		675,173	304,350	

2. The projected usage of fertilizer during the next 5 years is as follows :—

Crop	*1966* *(tons)*	*1967* *(tons)*	*1968* *(tons)*	*1969* *(tons)*	*1970* *(tons)*
Tea	170,000	180,000	190,000	200,000	210,000
Rubber	25,000	27,000	28,000	29,000	30,000
Coconut	55,000	60,000	65,000	70,000	75,000
Paddy	70,000	85,000	105,000	125,000	150,000
Other Crops	20,000	23,000	27,000	32,000	38,000
Total	340,000	375,000	415,000	456,000	503,000

Tea

3. It is anticipated that 170,000 tons of fertilizer will be used in tea plantations in 1966. About 75 per cent of the tea lands consist of well organised plantations of over 100 acres in extent and as the return on the application of fertilizer to these lands is high, there is scope for increase in the level of consumption on tea lands. The projected

increase over the current level of consumption is based largely on the "ratio method" of manuring whereby the nutrients permanently removed in the plucking of the green tea leaf are replaced by artificial fertilizer and the soil fertility maintained throughout. Thus, increases in the output of green tea leaf per acre, which are in the region of 2.4 per cent. per annum have to be compensated by increases in the input of fertilizer.

Rubber

4. The use of fertilizer on rubber lands has remained at an overall average figure of just less than 1 cwt. an acre (which is also more or less the same average level of application in Malaya.) Fertilizer is mainly used on the acreage of young rubber to assist in the tree-growth, and the bulk of the consumption is taken up by immature rubber and rubber that just comes into tapping. Fertilizers play a less significant role in yield increases in the case of mature rubber, and hence the older rubber plantations receive little or no fertilizer applications. Unless the pattern of fertilizer usage alters appreciably it appears that fertilizer consumption in rubber will be limited to small increases depending on the amount of replanting that is taken up under the Rubber Replanting Subsidy Scheme. On this basis fertilizer consumption in rubber lands is estimated to increase from 25,000 tons in 1966 to 30,000 tons in 1970.

Coconut

5. Coconut offers the most economic prospects for fertilizer use. Yet, the current level of fertilizer consumption is barely adequate to fertilise a third of the total acreage under coconut. The major factors which tend to contain the rate of increase in consumption are:

(1) Nearly 70 per cent of coconut lands or about 750,000 acres are owned by small-holders who are generally conservative in their outlook.

(2) Lack of credit facilities.

(3) Insufficient retail outlets for the distribution of fertilizer.

(4) Unfavourable weather conditions.

A reasonable increase in fertilizer usage has been provided for as certain proposals to offer better credit and more aid for fertilizer usage are under consideration.

6. It is anticipated that the acreage cropped under paddy will increase by about 50,000 acres per year. About 92 per cent. of the lands under paddy consist of small-holdings of less than 5 acres in extent and the balance of medium sized holdings. Government proposes to give all assistance possible to increase fertilizer usage on paddy lands, as this measure will serve to reduce the volume of

foreign exchange required for the importation of rice. In this connection, it might be mentioned that the first results from a Soil Fertility Survey which is being conducted by an Agronomist of the F.A.O. indicate that there can be an increase of about 40 per cent. in yields in the Dry one areas of Ceylon on account of the proper usage of fertilizer together with fertilizer responsive varieties of seed on lands with an assured supply of water. It has also been indicated that there will be a smaller though substantial increase in yields in the Wet Zone areas of the Island. The projected increases in fertilizer usage on paddy lands are based on the implementation of the schemes for making fertilizer more readily available to paddy cultivators which are outlined below.

II. Government Aid for Fertilizer Usage

7. Direct assistance is not given to tea and rubber cultivators for fertilizer usage. Under the Tea Rehabilitation Scheme, which is financed by a cess on tea exports, smallholders whose lands are taken up for rehabilitation obtain a cash subsidy to meet half the cost of their requirements of fertilizer. About 12,000 tons of fertilizer are supplied per year under this scheme. The rehabilitation of the acreage originally taken up is likely to be completed in 1966. Representations have been made that the scheme should be extended thereafter to cover a further extent of land. If this is done, a similar tonnage of fertilizer is likely to be distributed under it annually from 1967 onwards.

8. The Rubber Control Department has made arrangements to supply about 1,000 tons of fertilizer per year to smallholders whose lands are taken up for rehabilitation under a similar scheme. In this instance the Department merely provides a service and does not provide aid for the purchase of fertilizer.

9. Cultivators of coconut lands of over 20 acres in extent can obtain a subsidy of 33⅓ per cent. of the cost of thtir fertilizers on application to the Commissioner of Coconut Rehabilitation. Cultivators of coconut lands of less than 20 acres in extent can obtain a subsidy of 0 per cent. of the cost of their fertilizer in the same way. These subsidies are financed by Government grants.

10. Subsidised fertilizer is supplied by the Department of Agrarian Services through its stores and through Co-operative Societies and Cultivation Committees to paddy cultivators. Where the cultivator, Co-operative Society or Cultivation Committee purchase the fertilizer on cash payment, they receive a subsidy of 50 per cent. of the

cost of the fertilizer. Where Co-operative Societies obtain fertilizer on loan from the Department for issue to cultivators on loan, they receive a subsidy of 33⅓ per cent. of the cost of the fertilizer.

III. Fertilizer Distribution System

11. Prior to 1964, all fertilizer used in Ceylon was imported by two major Companies which handled about 60 per cent. of the imports between them and by a handful of small Companies which imported the balance. Government set up the Ceylon Fertilizer Corporation in 1964 to handle in the first instance its requirements of fertilizer for issue under the various Subsidy and Rehabilitation Schemes outlined above, and for use in its own agricultural ventures. The volume of business entrusted to the Corporation in 1965 was as follows :—

	Tons
Tea Rehabilitation Scheme	12,000
Rubber Rehabilitation Scheme	1,000
Coconut Subsidy Scheme	50,000
Paddy Subsidy Scheme	51.350
Sundry Crops	5,650
	120,000

This represents about 35 per cent. of the Island's fertilizer requirements.

12. The projected volume of Government's requirements of fertilizer for issue under these schemes during the next 5 years is as follows :—

Crop	*1966* (*tons*)	*1967* (*tons*)	*1968* (*tons*)	*1969* (*tons*)	*1970* (*tons*)
Tea	12,000	12,000	12,000	12,000	12,000
Rubber	1,000	1,000	1,000	1,000	1,000
Coconut	55,000	60,000	65,000	70,000	75,000
Paddy	70,000	85,000	105,000	125,000	150,000
Sundry Crpos	6,000	6,500	7,000	7,500	8,000
Total	144,000	164,500	190,000	215,500	246,000
Percentage of total consumption	42·35	44·10	46·12	47·57	49·40

13. There are no facilities in the Island's ports for the discharging of fertilizer in bulk form. It has so far been assumed that it would

not be economic to provide bulk discharging facilities at the ports as the major fertilizer stores are situated several miles away from the ports and are themselves not equipped to handle fertilizer in bulk form.

14. Since tea, rubber and coconut fertilizers are supplied in mixed form and since a large number of combinations are required for use in varying soil conditions, all the Island's fertilizer mixing and storage plants are situated in the suburbs of Colombo. As the bulk of the produce from tea, rubber and coconut lands is exported via Colombo, the cultivators thereof do not find it unduly difficult to get down their requirements of fertilizer by the vehicles which take their produce to Colombo.

15. Paddy fertilizer is at present supplied in unmixed form for application in 12 different combinations of N.P.K. in varying soil conditions. Prior to 1960, paddy cultivators too had to get down their fertilizer from Colombo through their Co-operative Societies. In that year the Department of Agrarian Services embarked on a programme for the construction of three fertilizer stores of 1,000 ton capacity, 11 stores of 350 ton capacity, and 33 stores of 200 ton capacity. This programme is now nearing completion. As an interim measure, the Department also set up about 20 temporary stores in rented buildings which are not suitable for permanent use.

16. Only a handful of the 4,700 Co-operative Societies which service the majority of paddy cultivators have been able to set apart any storage for fertilizer, and the balance obtain stocks of fertilizer only to meet pending orders placed by paddy cultivators.

IV. **Proposed Improvements to Distribution System**

17. When the Ceylon Fertilizer Corporation was set up in 1964, it was proposed to nationalize at least a part of the private sector so that the Corporation would immediately be provided with mixing and storage facilities. Cabinet approval is now being sought for the Corporation to set up its own mixing and storage plant within the next two years. This will help to ease the strain on the existing mixing and storage capacity of the private sector which is inadequate to cope with the demand during peak consumption periods.

18. Rupee funds have already been provided for the construction of a store of 50,000 ton capacity and the import of three mixers with a mixing capacity of 75,000 tons per annum, and ancillary equipment (e.g. bagging machinery and a conveyor belt system). The total cost

of this project will be in the region of Rs. 2.5 million of which Rs. 1.5 million will be needed in the form of foreign exchange for the importation of machinery.

19. The major limitation on the use of fertilizer in paddy lands has been the lack of adequate storage in paddy producing areas. This is evidenced by the fact that the volume of fertilizer used, which had remained at about 20,000 tons for two or three years, showed a steady increase after 1960 when the Department of Agrarian Services commenced setting up its chain of small stores, as follows :—

Financial Year	*Number of Stores*	*Paddy fertilizer consumption (tons)*
1959–60	2	20,173
1960–61	22	29,041
1961–62	32	38,075
1962–63	54	47,058
1963–64	58	60,096

20. The great majority of paddy cultivators are impoverished peasant farmers. They generally decide to use fertilizer only very shortly before it is due to be applied, i.e. after they have made sure that the rainfall at the beginning of the cultivation season is sufficient to make a successful cultivation likely, and after they have provided themselves with cash or loans for the purchase of fertilizer, both of which cannot be obtained until they are paid for the produce sold from the previous season's harvest. The recommended dosage being about 3 cwts. per acre they need less than a cartload, and the only economic way of transporting fertilizer to their fields is by cart. For all these reasons they cannot be expected to use the optimum quantities of fertilizer unless they are enabled to buy their requirements over the counter from a village level fertilizer store.

21. A scheme has been prepared for the granting of loans to Co-operative Societies for the construction of 50 ton fertilizer stores costing about Rs. 7,500 each and Cabinet approval will shortly be sought for the implementation of this scheme. However, as the profits earned by Co-operative Societies on the sale of fertilizer are comparatively small and as many societies do not wish to increase their repayment obligations on loans taken for capital expenditure, it is anticipated that not more than 1,500 Societies are likely to construct

fertilizer stores under this scheme and that too over a period of 5 years as follows :—

Year	*Number of stores taken up for construction*	*Funds required for financing stores construction (Rupees)*
1966	200	1,500,000
1967	220	1,650,000
1968	260	1,950,000
1969	340	2,550,000
1970	500	3,750,000

On the other hand, if grants could be made to suitable societies in areas with a high fertilizer consumption potential, it may be possible to provide adequate village level storage for fertilizer by means of 2,000 stores constructed in a period of 3 years as follows :—

Year	*Number of stores taken up for construction*	*Funds required for financing stores construction (Rupees)*
1966	400	3,000,000
1967	600	4,500,000
1968	1,000	7,500,000

This measure could be considered as it will speed up the rate of increase of fertilizer application on paddy lands. As metalwork in buildings used for storing fertilizer tends to perish rapidly, a Type Plan for the construction of these stores with local materials such as brick, wood and asbestos has been drawn up. If this Type Plan is used no foreign exchange will be required for this scheme.

22. The programme for the construction of fertilizer stores of 200 and 350 ton capacity was adopted in 1960 as funds were not available at the time for the construction of a like number of stores of a larger capacity. These stores were intended to serve as primary distributors from which Co-operative Societies would obtain replenishments of their stocks. Since the demand for paddy fertilizer is confined to two months for each of the two cultivation seasons and since the latter vary from year to year with the rains, no regular replenishment schedule can be arranged for stores of 200 or 350 ton capacity. The draw-off during these periods is so heavy that frequent breakdowns of supplies occur as it takes about two weeks for fresh stocks to be sent from Colombo on receipt of a request for replenishment from the local Storekeeper. The time lag cannot be economically reduced either by providing the Ceylon Fertilizer Corporation with

a fleet of lorries (as the demand for replenishment of stocks is concentrated within two short periods) or by attempting to strengthen the Island's normal transport services, which cannot be readily geared to meet this type of need.

23. Cabinet approval has, therefore, been sought for the construction of 26 fertilizer stores of 1,000-3,000 ton capacity by the Ceylon Fertilizer Corporation. A regular replenishment schedule can be arranged for stores of this size. Since it is desirable to provide Co-operative Societies with a source of supply as close to their area of operation as possible, provision has been made for at least one store in each of the Island's 22 administrative districts. The total capacity of these stores will be in the region of 41,000 tons which will be adequate to channel up to 200,000 tons of fertilizer per year to Co-operative Societies and cultivators. If prefabricated materials suitable for the construction of fertilizer stores of these sizes are obtainable from foreign sources, it is desirable that they should be obtained so as to reduce the time required for the completion of the programme. Plans have, however, tentatively been prepared on the basis that local materials will be used. The projected expenditure on this basis is as follows :—

Year	*Annual Expenditure (Rupees)*
1966	1,000,000
1967	1,500,000
1968	1,500,000

V. Financial Provision

24. A schedule showing the estimated requirements of rupee funds and foreign exchange for the programme of fertilizer usage outlined above is annexed hereto. The C.I.F. values of fertilizer imports have been calculated on the basis of current world market prices.

FERTILIZER USAGE PROGRAMME

Financial Provision Required

I.—C. I. F. Value of imported Fertilizer :

	Government Sector		Private Sector		Total	
	Tons	*Rs.*	*Tons*	*Rs.*	*Tons*	*Rs.*
1966						
Ammonium Sulphate	75,148	23,746,768	111,583	35,260,228	186,731	59,006,996
Muriate of Potash ..	24,367	6,627,824	36,182	9,841,504	60,549	16,469,328
Rock Phosphate ..	28,433	4,350,249	42,218	6,459,354	70,651	10,809,603
Urea ..	12,000	6,516,000	—	—	12,000	6,516,000
Others ..	4,052	1,458,720	6,017	2,166,120	10,069	3,624,840
Total ..	144,000	42,699,561	196,000	53,727,206	340,000	96,426,767
1967						
Ammonium Sulphate	82,264	25,995,424	118,699	37,508,884	200,963	63,504,308
Muriate of Potash ..	26,675	7,255,600	38,489	10,469,008	65,164	17,724,608
Rock Phsophate ..	31,125	4,762,125	44,911	6,871,383	76,036	11,633,508
Urea ..	20,000	10,860,000	—	—	20,000	10,860,000
Others ..	4,436	1,596,960	6,401	2,304,360	10,837	3,901,320
Total ..	164,500	50,470,109	208,500	57,153,635	373,000	107,623,744
1968						
Ammonium Sulphate	91,088	28,783,808	126,385	39,937,660	217,473	68,721,468
Muriate of Potash ..	29,536	8,033,792	40,981	11,146,832	70,517	19,180,624
Rock Phosphate ..	34,464	5,272,992	47,819	7,316,307	82,283	12,589,299
Urea ..	30,000	16,290,000	—	—	30,000	16,290,000
Others ..	4,912	1,768,320	6,815	2,453,400	11,727	4,221,720
Total ..	190,000	60,148,912	222,000	60,854,199	412,000	121,033,111
1969						
Ammonium Sulphate	102,759	32,471,844	134,639	42,545,924	237,398	75,017,768
Muriate of Potash ..	33,320	9,063,040	43,658	11,874,976	76,978	20,938,016
Rock Phosphate ..	38,880	5,948,640	50,942	7,794,126	89,822	13,742,766
Urea ..	35,000	19,005,000	—	—	35,000	19,005,000
Others ..	5,541	1,994,760	7,261	2,613,960	12,802	4,608,720
Total ..	215,500	68,483,284	236,500	64,828,986	452,000	133,312,270
1970						
Ammonium Sulphate	117,276	37,059,216	143,464	45,334,624	260,740	82,393,840
Muriate of Potash ..	38,028	10,343,616	46,519	12,653,168	84,547	22,996,784
Rock Phosphate ..	44,372	6,788,916	54,281	8,304,993	98,653	15,093,909
Urea ..	40,000	21,720,000	—	—	40,000	21,720,000
Others ..	6,324	2,276,640	7,736	2,784,960	14,060	5,061,600
Total ..	246,000	78,188,388	252,000	69,077,745	498,000	147,266,133

II.—Programme for construction of mixing plant of the Ceylon Fertilizer Corporation.

Year	*Construction of 50,000 ton capacity stores*	*Purchase of 3 mixers and ancillary equipment*
	Rupee Funds	*Foreign Exchange*
1966	500,000	—
1967	500,000	1,500,000

III.—(A) Programme for granting loans to Co-operative Societies for construction of 50 ton Fertilizer Stores :

Year	*Rupee Fund*	*No. of Stores*
1966	1,500,000	200
1967	1,650,000	220
1968	1,950,000	260
1969	2,550,000	340
1970	3,750,000	500

(B) Alternative programme for making cash grants to Co-operative Societies for construction of 50 ton Fertilizer Stores :

Year	*Rupee Fund*	*No. of Stores*
1966	3,000,000	400
1967	4,500,000	600
1968	7,500,000	1,000

IV.—Programme for construction of 26 District Stores of 1,000–3,000 ton capacity by the Ceylon Fertilizer Corporation :

Year	*Rupee Fund*
1966	1,000,000
1967	1,500,000
1968	1,500,000

Vegetable and Fruit Production

VEGETABLE AND FRUIT PRODUCTION

Vegetables

Vegetables are an important component of human diet, supplying the requirements of important minerals, certain essential vitamins and the necessary roughage. An adequate daily supply of high quality vegetables is thus indispensable in maintaining the health of a people.

2. The vegetables currently grown in Ceylon could be grouped as follows :

(1) *Leafy Vegetables*

Katuru-murunga, Murunga, Kankun, Mukunuwenna, Gotukola, Spinach, Sarana, Kohila, Cabbage, Lettuce, Leeks and Cauliflower.

(2) *Vegetable Fruits*

- (*a*) Bandakka, Brinjal, Tomato and Capsicum,
- (*b*) Red pumpkin, Ash pumpkin and Cucumber including Kekiri,
- (*c*) Snake gourd, Bitter gourd, Luffa (veta-kolu) and Bottle gourd,
- (*d*) Cowpea and Beans,
- (*e*) Ash plantain.

(3) *Roots and Tubers*

- (*a*) Carrots, Beets, Radish, Knol-khol and Turnips,
- (*b*) Starchy vegetables : Potatoes, Sweet Potatoes, Yams and Manioc.

Of these vegetables the following are cultivated predominantly in the up-country districts of Nuwara Eliya and Badulla and are commonly referred to as up-country or exotic vegetables :—Cabbage, Beets, Carrots, Radish, Knol-khol, Leeks, Cauliflower and Turnip. The other vegetables, referred to as low-country or local vegetables, are cultivated over the low and mid-country zones of the Island.

3. The optimum daily requirements of the different classes of vegetables for various age groups of children, adolescents and different classes of adult men and women have been worked out by the Medical Research Institute. These requirements, which are derived from nutrition studies and dietary surveys carried out in the country over several decades are included in appendix I. Based on this data, it is estimated that the optimum total annual requirements of vegetables of the current population in Ceylon would be about 725,000 tons. This would mean an optimum requirement of about 2,000 tons of fresh vegetables per day.

Consumer surveys carried out in 1958 by the Department of Census and Statistics have shown that the average annual consumption of vegetables was 74.74 pounds per person or a daily consumption of about 3 1/3rd oz. per person. Assuming that there has been no marked increase in the per capita consumption of vegetables, it would not be unreasonable to place the current consumption of vegetables at around 400,000—425,000 tons annually or about 1,100 tons daily.

It will be seen that at least in terms of average figures that the people of Ceylon consume about 60 per cent. of their optimum daily requirements of vegetables. Island-wide Dietary Surveys carried out by the Medical Research Institute over several years have indicated that the chief deficiency in the diet of the people is protein, both animal and vegetable protein which is however supplied by milk, meat and pulses. Serious deficiencies are found in relation to the supply of calcium, Vitamin A, and Riboflavin (Vitamin B). There are, however, no very marked deficiencies in the supply of Thiamin, Niacin, Ascorbic acid and Iron which are normally supplied by vegetables and fruits. There is a case for both an increased consumption of vegetables and for a better balance in types of vegetables consumed, particularly for a greater intake of leafy vegetables.

Increase in the consumption of vegetables per family is determined on the one hand by availability and price and on the other by income levels and standards of living. Within the limits set by current income levels it may not be possible to expect more than a twenty per cent. increase in consumpption even if production and marketing problems were solved. It would appear, therefore, that a total annual production of about 550,000 tons of a properly balanced supply of different types of vegetables spread evenly throughout the year would satisfy the current demand for vegetables.

4. The climate, rainfall and soil conditions enable the cultivation of a wide range of vegetables over nearly the whole of the Island. Vegetables have been grown in home gardens, in colonisation and

village expansion schemes, in 'chenas' and in some fallow paddy fields over most of the Island for home consumption and for sale at local 'fairs'. The practice of market gardening has been expanding over the years and there are new areas in the country that grow certain types of vegetables exclusively for the urban market.

The estimated total production and the acreage of different vegetables for Maha 1963-64 and Yala 1964 are given below :—

TABLE I

Total Acreage and Production of Vegetables in Maha 1963-64 and Yala 1964

	Total Acreage (Acres)	*Total Production (tons)*
Bandakka	18,091	14,752
Brinjal	39,973	25,535
Tomato	17,707	11,022
Snake gourd	8,023	12,438
Bitter gourd	6,223	7,035
Beans	6,362	6,071
Ash plantain	72,281	83,362
Potatoes	1,956	4,134
Sweet potatoes	35,503	55,980
Manioc	113,691	339,323
Ash pumpkin	6,477	6,094
Red pumpkin	13,672	15,944
Cucumber	6,109	9,193
Leafy Vegetables	11,759	5,469
Cabbage	5,851	9,246
Beets	2,046	2,206
Carrots	965	1,152
Radish	2,261	2,681
Knol-khol	1,891	2,219
Leeks	726	1,022
Total	361,367	614,879

The extent of capsicum, green chillie, luffa and long beans (Me) have not been estimated in the survey. Since considerable areas are under these vegetables the total extent under vegetables will have to be increased by this amount.

These figures were collected by the Department of Census and Statistics based on estimates made by their enumerators and the Grama-sevakas. These figures are subject to very considerable errors but in a general sense they indicate that a base for a vegetable development programme already exists in the country.

5. In terms of the supply of vegetables to the population there are two areas of operation. Firstly the almost total supply of vegetable requirements of the urban population and secondly a better distribution of vegetables in the rural areas to supplement the already available local production. Since in the urban areas it is difficult to grow vegetables and because the prices of vegetables in the cities and towns, particularly the prices prevailing in Colombo, determine the prices of vegetables elsewhere in the country, it would be advisable to concentrate in a short-term programme for the planned production of vegetables for supply mainly to the urban areas.

It has been estimated that the daily requirement of vegetables of the urban population, at present levels of consumption, is about 75,000 tons anually or about 180 tons daily. The daily estimated requirements of Colombo alone are around 80 tons. These requirements can be supplied from about 25,000 acres continuously under vegetables, distributed proportionately in the hill-country, mid-country and low-country zones of the Island.

The acreage under vegetables in different districts which at present grow vegetables chiefly for supply to the urban areas are given below:

TABLE II

Approximate Total Acreage under market gardens in Maha and Yala

	(*Acres*)
Nuwara Eliya	7,000
Badulla	15,000
Kandy	9,000
Matale	6,000
Kurunegala Ratnapura Chilaw	3,000
Colombo	1,500

In addition vegetables are supplied during December to March from the 'chenas' of the dry zone.

These figures are based on estimates made by the field staff of the Department of Agriculture and the Department of Census and Statistics. Accurate surveys are required for the correct estimates of the area under market gardening.

Here again, it will be seen that the area available for the supply of vegetables to the urban areas is adequate.

6. In general terms there is one period in the year when vegetable prices are high, reflecting a shortage of most vegetables, that is, in the months of May, June and July, the so-called off-season. Prices of vegetables also rise in December during the Christmas season and again around April during the New Year celebrations. There are also two periods when gluts occur—firstly in February and March when there is a surplus of vegetables produced over most of the country, particularly in the dry zone and again in August, September and October when there is a surplus of vegetables produced in the up-country and mid-country zones.

7. It would appear, therefore, that the problems connected with the development of vegetable production are not primarily one of increasing the area under production but mainly one of stabilizing the existing areas of production, of changing patterns of producing to ensure a better balance in the supply of different types of vegetables throughout the year. In addition to introducing more efficient marketing systems with a view to making a better and more effective use of the vegetables that are already produced in the country and in reducing the losses that now occur in transport, improvement in levels of production to meet increasing demands can be effected on these existing areas by the introduction of modern techniques of vegetable production and by improving the facilities now available to the vegetable cultivators.

In fact a rapid expansion in the acreage under vegetables and a consequent lowering in the price of vegetables can have disastrous consequences for small market gardeners who are now operating on ½-¾ acre plots in the chief vegetable growing areas. It may be desirable, therefore, not to expand the area under vegetables but to introduce a measure of planning of vegetable production and to organise collection and marketing.

8. In a short-term programme it will be difficult to organise production and marketing over the whole of the country, and it is threfore proposed to concentrate on the programme of vegetable production and marketing over the next five-years in the principal vegetable growing areas referred to in paragraph 5 above.

9. What are the problems of developing vegetable production in these areas ? How can these problems be solved within a short period of time ?

No definite Island-wide surveys have been carried out exclusively on the size of vegetable holdings but from the available information it is evident that vegetables are a small holders crop. For instance, surveys in the Nuwara Eliya District have shown that holdings varied in size from ⅛ to 3 acres and in the Badulla District from ¼ acres to 10 acres. Preliminary data from the 1962 Agriculture Census also confirm that over most of the Island vegetables are grown mainly on small-holdings.

Nearly all the problems of development stem from the fact that we are dealing with a very large number of disorganised small-holders who have for decades been exploited by the vegetable traders.

Production is at present on a more or less *ad hoc* basis, and there is no planned link between production and marketing. About 70 per cent. of the marketing of vegetables and fruits is handled by private traders, about 25 per cent. by Co-operative organisations and 5 per cent. by the Marketing Department. Produce is rarely graded and methods of packing and transport are generally poor with the result that damage and wastage in handling and transport vary from 5-30 per cent. and are often even higher. There are further losses after the vegetables reach the wholesale points.

The vegetable cultivators require adequate credit facilities, agriculture equipment, seed of improved varieties of vegetables, fertilizers, agro-chemicals and technical advice on modern methods of vegetable cultivation. On the marketing side, they require adequate marketing arrangements that would ensure satisfactory prices for their produce.

10. In formulating and executing a planned programme of vegetable development, it is clear that a centrally controlled organisation will be required to co-ordinate both the production and marketing programmes and to make the necessary institutional arrangements for carrying out the plan in the field.

Of the organisations already involved in vegetable production and marketing there is no doubt that a Government Department like the Marketing Department cannot be expected to take over the function of marketing all the vegetables produced in the country. In fact, that role of the Marketing Department should be primarily to guide and assist non-governmental organisations in the development of an efficient system of marketing.

The private traders at present market about 70 per cent. of the vegetables through a very large number of commission agents in Colombo, Kandy, Kurunegala and other towns. These agents who have conflicting interests and who generally operate in competition with each other cannot be expected to jointly develop and operate a really effective national plan for the production and marketing of vegetables. The private trader will, however, still have a role to play in a programme for the marketing of vegetables.

Any organisation that will bring the vegetable cultivators themselves directly into the planning and execution of the programme is likely in the long run to prove self-sustaining. In this respect the Co-operative Movement which has been growing steadily over the years particularly in the field of vegetable marketing offiers the best prospects for establishing a permanent organisation that will undertake a co-ordinated programme of production and marketing.

11. The main objective is to plan the production programme so as to ensure a regular supply of high quality vegetables throughout the year. This would involve the following :—

(*a*) expanding the area under vegetables in the 'off-season' firstly by providing lift-irrigation in the existing vegetable growing areas where a plentiful but at present inaccessible supply of water is available during the off-season, and secondly by 'developing' new areas where vegetables can be grown in the 'off-season',

(*b*) changing the pattern of production of different types of vegetables in areas where seasonal gluts presently occur so as to move into a different programme of regional specialization in the cultivation of vegetables,

(*c*) introducing the grading of vegetables and improving the handling, packing and transport of vegetables, and providing a satisfactory marketing organisation,

(*d*) generally introducing more efficient production techniques and improving the quality of vegetables.

It is, therefore, proposed that a planned programme of production to supply the urban requirements of vegetables be undertaken in the main vegetable producing areas through the All-Ceylon Agricultural Producers Union and its affiliated societies. The main outlines of such a Scheme which is already in operation and which have been agreed upon by the Departments of Co-operative Development, Marketing and Agriculture and the Peoples Bank are briefly given below :—

The vegetable scheme will operate initially in the Districts given below. (The vegetables grown in each District are also included roughly in the order of their present importance).

Badulla

Beans, cabbage, tomatoes, beets, carrots, radish, knol-khol, lettuce, leeks, cauliflower, green chillies, potatoes.

Nuwara Eliya

Cabbage, beets, radish, carrots, leeks, beans, knol-khol, turnips, cauliflower, peas lettuce, tomatoes, green chillies, potatoes.

Kandy

Capsicum, snake gourd, bitter gourd, tomatoes, luffa, brinjal, beans, long beans (Me green chillies, sweet potatoes, yams, ash plantain.

Matale

Snake gourd, luffa, bitter gourd, tomatoes, capsicum, beans, long beans (Me), bandakka, brinjal, green chillies, ash plantain, ash pumpkin, red pumpkin, cucumber.

Kurunegala

Red pumpkin, ash plantain, snake gourd, leafy vegetables, brinjal, bandakka, cucumber, luffa, ash pumpkin, sweet potatoes.

Ratnapura

Ash pumpkin, red pumpkin, cucumber, capsicum, green chillies, brinjal, long beans (Me), snake gourd, bitter gourd, luffa, tomatoes, ash plantain, beets, carrots, cabbage, murunga.

Colombo

Long beans (Me), bandakka, snake gourd, luffa, brinjal, bitter gourd, leafy vegetables, capsicum, cucumber, tomatoes, green chillies, sweet potatoes, yams.

Chilaw

Capsicum, green chillies, snake gourd, luffa, brinjal, cucumber, ash plantain.

Dry Zone Districts

Ash pumpkin, red pumpkin, cucumber, luffa, bitter gourd, tomatoes, brinjal, bandakka, long beans (Me), murunga.

Jaffna

Ash plantain, red pumpkin, tomatoes, murunga.

Credit. Financial credit will be given by the Peoples Bank to vegetable cultivators belonging to Societies registered under the Scheme. The credit will be channeled through the All Ceylon Agricultural Producers Union and the affiliated Co-operatives. The Scheme of granting loans through the Peoples Bank has however been in operation since January, 1965. A booklet outlining the credit facilities available to vegetable cultivators has already been prepared by the Peoples Bank.

Agricultural Supplies. The cultivators requirements of vegetable seeds, fertilizers, agro-chemicals, equipment and other requirements will be channeled through the All Ceylon Agricultural Producers Union and the Co-operatives. It will also become necessary for the Unions to make arrangements for the supply of cattle manure, in addition for the supply of crates, boxes and bags for the packing of vegetables.

Vegetable Extension Services. The Department of Agriculture will provide an extension service at District, Divisional and Village level that will specialise in the improvement of vegetable cultivation. The extension staff of the Department of Agriculture will work in close association with the field staff of the Department of Co-operative Development who will be deployed for work exclusively on the Vegetable Development Programmes.

A series of hand-books on vegetable cultivation, on the marketing, services offered by the All Ceylon Agricultural Producers Union and its affiliates and on the financial credit available through the Peoples Banks will be made availabe to the cultivators. In addition, films, slides, booklets and leaflets on vegetable cultivation are being prepared. It is proposed to organise in-service training of departmental staff and also to undertake special training courses for cultivators.

Vegetable Research. Agricultural Experiment Stations are at present located as follows :—Sita-Eliya to serve the up-country zone, Maha-Illuppallama the dry zone, Peradeniya the mid-country wet zone and Walpita the low-country wet zone. Work on these stations will be devoted to testing improved varieties of the vegetables best suited for the zone, to developing improved cultural and fertilizer practices and better techniques of pest, disease and weed control.

Seed Supply and Seed Production. Experiments carried out by the Department of Agriculture have shown that it is uneconomic to produce seeds of carrots, beets, cabbages, leeks, knol-khol, cauliflower and beans in Ceylon. Seed of improved varieties that have proved their superiority under local conditions will therefore have to be imported annually. At present the Department of Agriculture imports 2/3rd and the private trade about 1/3rd of the seed requirements of the vegetable cultivators. It is proposed that this arrangement be continued as it ensures that high quality seed can be made available to the cultivators in suitably sized packs at relatively low prices. This seed will be distributed to growers primarily through the All Ceylon Agricultural Producers Union but also through the extension staff of the Department of Agriculture and the private trade.

Foundation seed of improved varieties of low-country vegetable seeds such as Bandakka, Brinjal, Capsicum, Snake gourd, Bitter gourd, Luffa, etc., are at present produced at the Seed Station at Katugastota The facilities and scope for expansion at this Station are limited and it is proposed to establish a Seed Station at either the Pelwehera Agricultural Station or the Maha-Illuppalama Research Station. Aid for the establishment of this Station is being sought from the Government of West Germany. A Seed Testing Laboratory, a private "seed farmers" and seed certification scheme similar to that operating for Paddy will also be established.

Marketing. Detailed proposals for the marketing of vegetables have already been submitted by the Commissioner for Development of Marketing. It is necessary to draw attention to the need for the establishment of a Market Research Unit in the Marketing Department. which will advise cultivators, the All Ceylon Agricultural Producers Union and the Private Traders on the best methods of grading, packing and transport of vegetables and also establish standards for grading and packing. It is expected that the Unit will also carry out surveys of production, market demand and prices of each type of vegetable throughout the year so as to enable annual production plans to be drawn up. It will also be necessary to keep cultivators regularly informed of the prices prevailing at the main wholesale points in the towns and cities.

12. It is clear that in the formulation and implementation of the detailed plans the Departments of Co-operative Development, Agriculture, Marketing, Census and Statistics, the Peoples Bank and the All Ceylon Agricultural Producers Union will have to work closely together. It is proposed that the following arrangements be made for the planning and implementation of the Scheme :—

(i) A central standing committee be established consisting of representatives from the Departments and Institutions listed above. It may also be necessary to include a representative from the Planning Department,

(ii) a co-ordinating committee consisting of district representatives of the All Ceylon Agricultural Producers Union and the Departments of Agriculture, Co-operative Development, Marketing and Branch Managers of the Peoples Bank be set up at district level,

(iii) village level committees be established consisting of the Co-operative Societies and representatives of the Departments of Agriculture, Co-operative Development and Marketing.

13. If these proposals are accepted a detailed programme for the production and marketing of vegetables will have to be drawn up by the Standing Committee. As a preliminary a certain amount of accurate basic data on the production and marketing of vegetables in the project area will be required and it will be necessary to carry out a full scale survey in the area. In the meantime an immediate programme of off-season cultivation can be undertaken in the Kandy and Matale Districts as a priority item in this programme.

The staff required for this programme is being deployed by the respective Departments. Detailed requirement of vegetable seeds, fertilizers, agro-chemicals, machinery, pumps etc., will have to be worked out by the Standing Committee.

Fruits

The wide variations of climate and rainfall in Ceylon have permitted the cultivation of a rich range of tropical, sub-tropical and temperate fruits. A list of the more important fruits grown in the different agro-climatic zones in Ceylon is given below :—

Low-country dry zone :	
Rainfed	Mango, cashew, woodapple, pomegranate, sapodilla, nelli, lime
Surface or sub-surface irrigation	Sweet orange, lime, grapefruit, mandarin, jak, banana, grapes, passionfruit,
Intermediate zone :	
Rainfed	Banana, papaw, guava, sweet orange, limes, mandarin, grapefruit, pineapple, mango, passionfruit, sapodilla, beli, woodapple, anonas, jak,
Low-country wet zone :	
Rainfed	Pineapple, banana, papaw, mango, rambuttan, mangosteen, passionfruit, durian, beli, sapodilla, anona, jak, lemonime, orange, limes, avacado, uguressa, guava,
Mid-country wet zone :	
Rainfed	Avacado, banana, mangosteen, sapodilla, durian, rambuttan, passionfruit, beli, mango, papaw, guava, anonas, custard apple, ambarella,

Hill-country dry zone :

Rainfed	Pears, apples, cherimoyer, passionfruit, granadilla, lemon, peaches, grapes guava, strawberry, cape, gooseberry, mountain papaw, apricots, plums loquat, persimom,

Hill-country wet zone :

Rainfed	Pears, strawberry, tree-tomato, passionfruit, granadilla, mountain papaw, marmalade orange, raspberry, blueberry.

2. No accurate statistics are available of the exact extents under these fruits and of the size of individual orchards, but from the available information it is apparent that most of these fruits are grown in mixed home gardens. There are, however, small orchards of bananas, mangoes and citrus in different areas in the country. In recent years the commercial cultivation of pineapples has been expanding in the wet zone particularly in the Colombo district. Apart from this development there has been no marked tendency for the establishment of large orchards of the other fruits.

~~It is~~ clear, therefore, that fruit production in the country is still in a relatively undeveloped state. It cannot be expected that any great increase in the sustained production of high quality fruit can be obtained from the widely scattered home gardens because under these conditions there is considerable difficulty in introducing scientific methods of fruit production and in organising an adequate marketing system.

3. The solution to the problem of developing fruit production would be therefore to organise the prduction of each type of fruit or fruits best suited to a given agro-climatic zone in compact areas within each zone. This would facilitate marketing, the introduction of modern methods of production and the provision of a specialist technical extension service.

This will have to be done by (a) establishing new orchards on the basis of a regional specialisation in fruit production and (b) by changing the pattern of production wherever possible of the mixed home gardens and by replacing several types of fruits now grown in a single home garden with improved high quality strains of one or two types of fruits so that the production of a given type of fruit would be concentrated in selected areas. In this way a scheme of regional specialisation could gradually be introduced.

In carrying out this programme it will be necessary to provide the facilities that are required by the fruit grower. Credit, a supply of high quality planting material, agro-chemicals, agricultural equipment and the services of a trained advisory service are essential. Proper marketing arrangements will also have to be made.

4. In order to provide these facilities, it is proposed that the same organisation and institutional arrangements that are being set up for the planning and execution of the vegetable production programme be utilised in the production and marketing of fruits. This would mean that the Departments of Co-operative Development, Marketing and Agriculture, the Peoples Bank and the All Ceylon Agricultural Producers Union will have to work closely together. It is proposed that the same Standing Committee that is being set up for vegetables be used in co-ordinating the programme of fruit production and marketing.

In the programme of fruit production emphasis will be placed on the following crops, many of which also have an export potential :—

Pineapples

A programme is already in operation to bring 6,000 acres under pineapple in the Colombo District. A special credit scheme of granting loans for the planting and cultivation of pineapple has already been set up. Two special Pineapple Extension Officers are at present working with the cultivators. Marketing is organised through the Co-operative Societies, the All Ceylon Agricultural Producers Union and the Marketing Department. This scheme will be extended as the canning capacity of the Canning Factory is increased and also as the market for fresh fruit expands. The potential for an export market in pineapples is being examined.

Mango

Emphasis on mango cultivation will be placed on the development of orchards of karathakolamban, vellaikolamban, willard and ambalavi, mainly in the Vavuniya, Anuradhapura, Polonnaruwa and Amparai Districts and particularly in the Colonisation Schemes where many of the highlands are already under mango. In the wet zone the programme will be directed at establishing selected strains of local mangoes such as betti, dampara, mee, gira, pol-amba and locally selected strains of vellaikolamban and willard in home gardens.

Citrus

A special extension programme is being undertaken for the improvement of citrus cultivation e.g., oranges, limes, mandarin and grapefruit in the Bibile-Moneragala area and in other selected areas of the dry zone. If the current tube-well drilling investigations in the Mannar district confirm the availability of adequate sources of underground water in this area a Citrus Research Station will be established near Mannar. This station will investigate the problems of citrus cultivation under lift irrigation and will undertake the selection of adapted high quality planting material. It is expected that very large commercial orchards of citrus can be established on the deep soils in the Puttalam, Mannar and Jaffna Districts if these experiments are successful.

Bananas

A special development programme will be undertaken in the Kegalla, Kandy, Matale, Kurunegala, Ratnapura, Matara and Jaffna Districts. A Banana Extension Officer is already working in the Kegalla district.

Grapes

Special emphasis will be paid to the cultivation of grapes in the following districts :—Jaffna, Vavuniya, Puttalam and Badulla.

Other Fruits

In addition, attention will be paid to the development of fruit cultivation in the following zones :—

Low-country dry zone

Cashew (Puttalam, Mannar, Jaffna and Batticaloa Districts) woodapple.

Intermediate zone

Papaw, passionfruit, guava, beli.

Low-country wet zone

Papaw, rambuttan, mangosteen, anonas, passionfruit, beli, sapodilla.

Mid-country wet zone

Avacado, mangosteen, sapodilla, rambuttan, beli, papaw, passionfruit.

Hill-country dry zone

Pears, apples, cherimoyer, passionfruit, lemon

Hill-country wet zone

Pears, strawberries, mountain papaw, passionfruit.

5. The primary requirement for the fruit development programme is an adequate supply of certified high quality planting material for sale to fruit growers.

The Department of Agriculture cannot undertake to supply all the planting material required by growers and there are at present no other organised sources of supply. In order to correct this position a system of registered private nurserymen is being organised in the different areas of the country. These nurserymen will be registered by and operate under the supervision of officers of the Department of Agriculture. Planting material raised by them will be 'certified' as fit for sale by inspecting officers before it is sold to the public. A special News Letter, that will be published monthly will keep other nursery-men and the public informed of the availability of planting material in the different areas of the country.

The role of the Department of Agriculture in this programme would be to supply tested, high quality 'foundation' planting material and bud-wood to the registered nurserymen for multiplication and distribution to the public. In addition, the Department will train nurserymen and undertake the supervision of the nurseries and the certification of planting material.

For the purpose of producing sufficient 'foundation' planting material, the Department of Agriculture is establishing central nuseries on several Government Farms located in different areas of the country. The main nurseries are listed below :—

Low-country dry and intermediate zone

Tinnevelly, Vavuniya, Maha-Illuppallama, Hingurakgoda, Pelwehera, Bibile, Bataata, Middeniya.

Proposed new station at Mannar.

Low-country wet zone

Ambepussa, Wariyapola, Pasyala, Horana, Bandaragama, Wagolla.

Mid-country wet zone

Kundasale, Karapincha.

Hill-country dry zone

Rahangala.

Proposed new station at Diyatalawa.

Hill-country wet zone

Sita-Eliya.

Extension Services. Special Extension Officers for extension work on individual fruit varieties will be appointed in the different areas as the programme develops. There are at present two Pineapple Extension Officers working in the Colombo District and one Banana Extension Officer in the Kegalla District.

Fruit Research. Work on the selection of improved strains of both local and introduced varieties of fruits, on the development of suitable fertilizer and management practices and on the control of pests, diseases and weeds will be undertaken at the following Departmental **Stations :—**

Tinnevelly

Grapes.

Proposed new station at Mannar.

Citrus, grapes and cashew.

Maha-Illuppallama

Mango, bananas, limes, grapes, woodapple, pomegrante, etc.

Biblie

Citrus.

Walpita

Pineapple, passionfruit, mango, beli, etc.

Kundasale

Avacado, bananas, mangosteen, mango, anonas, passion fruit, beli, etc.

Rahangala

Pears, apples, grapes, peaches, plums, etc.

Sita-Eliya

Pears, strawberries, tree-tomato, mountain papaw, etc.

Marketing. Arrangements similar to that proposed for vegetables will be made in the case of fruits. It is expected that the Marketing Department will make arrangements for the purchase of cannable fruits in the same way as for pineapples.

Canning of fruits. Proposals for the canning of fruits have been included in the report of the Commissioner for the Development of Marketing.

APPENDIX I

Optimum Daily Requirements of Vegetables in ounces*

		Leafy Vegetables	*Other Vegetables*
Children	1–2	½	1
	3–4	1	2
	5–6	1	2
	7–8	1	2
	9–10	1	2
Boys	11–12	2	4
	13–14	2	4
	15–19	2	4
Girls	11–12	2	4
	13–17	2	4
Expectant Mothers		2	6
Nursing Mothers		2	6
Working Woman		2	4
Woman without Exercise		1	3
Worker		2	4
Man without Exercise		2	4

**Source :* Medical Research Institute.

[illegible]

Planning of public transport for the carrying of traffic have been [illegible] by the report of the Commissioner for the Development of Melbourne.

Vegetable and Fruit Marketing

VEGETABLE AND FRUIT MARKETING

1. Agricultural production in our Island falls broadly into two categories: the plantation sector and the unorganised private sector. The set up for the plantation sector is not covered in this scheme. The unorganised private sector can itself be divided into sectors in relation to the role of Government activity concerning them. First there are the commodities that carry a guaranteed price for which there is a special organisation under the aegis of the Department of Agrarian Services. It is true of course that in this set up a few commodities have assumed dominance over a number of minor commodities for which in any case it has been difficult to work out an organisation both for purchase and disposal as in the case of the principal commodities like paddy and onions. It would appear therefore that the activities of the Marketing Department at least initially might have to extend to some minor commodities which do carry a guaranteed price but which seem to have not reaped the benefits of any price support schemes owing to the absence of an organisation to make these schemes effective.

2. For the present, this plan is concerned only with agricultural produce that does not carry a guaranteed price. All problems in this field hitherto had been assumed to be connected with or flowing out of the dual task of helping the cultivator dispose of his produce at a reasonable price and making this produce available to the consumer also at a reasonable price. However in the context of planned economic development no marketing scheme can be complete unless it is connected with a production programme: (i) collection of produce at the growers end; (ii) grading, packing and transport of produce; (iii) wholesale and retail facilities for distribution and (iv) off setting seasonal fluctuations through (*a*) processing or preserving and (*b*) planned production. The solution of these problems will give the country a streamlined marketing organisation.

3. The task of providing the Island with a streamlined marketing organisation has been the responsibility of the Marketing Department. When the Department was first set up in 1935, it set about this task by opening centres for the collection of agricultural produce in the grower areas, and establishing sales points in the consumer areas to popularise the use of these products. These latter points which were initially more or less propaganda units in the consumer areas during

the days of unrestricted imports, became check stalls and fair price stalls under war-time conditions in the face of acute scarcities in consumer commodities. In this context one may surmise that the major activity of the Marketing Department was to maintain certain levels in the market through the system of check points; both for collection and sale. In spite of the meritorious record of this scheme it has not been able to make a considerable impact on the general market purely on account of its negligible scale of operations; even today the share of the Marketing Department in vegetables and fruits is estimated to be about 5 per cent. of the total transactions.

4. In fact this position was realised as long ago as the late thirties which resulted in some positive thinking towards controlling the private sector which is by far the major partner in these transactions: todays share of the private sector is estimated at about 70 per cent. of the total while the co-operative sector is estimated to handle about 25 per cent. of the trancactions. Control of the private sector was sought through legislative enactments: (i) The Agricultural Produce Regulations Act:—this act sought to compel importers to buy a fixed quota of local produce against their imports; (ii) Agricultural Produce Agents Act:—this act sought to regulate the activities of Commission Agents so as to ensure that the producers got a fair deal from the middleman and (iii) Agricultural Produce—Grading and Packing Act:—this act sought to enforce standards for grading and lay down specifications for packs used in the transport of vegetables and fruits. It may be mentioned that the first Marketing Commissioner, Mr. R. H. Basset, was at the same time thinking of enabling legislation to set up organisations of producers on the lines of the different Agricultural Marketing Boards as found in Australia which would have been the answer towards planned production. Anyhow, even of the legislative measures that were enacted only the Produce Regulations Act was enforced and today even that seems unnecessary in the face of selective exchange control for imports. Enforcing the other two Acts is a vital need, but in the state of the Market Organisations today any amount of legislative compulsion will be of no avail. One of the first tasks is therefore to provide the necessary facilities to the private sector to engage in these transactions in an atmosphere of true competition and thereafter if necessary seek legislative compulsion to enforce grades and standards.

5. The co-operative sector has come into this field only recently. Of course there had been in the past a few isolated producer societies and some consumer co-operatives too have been trading in vegetables and fruits. The first concerted action towards a producers' Co-operative came from Jaffna with the setting up of the plantain producers'

Co-operatives which have a trading agreement with the Marketing Department to dispose of their produce. The co-operatives that look after the interests of pineapple growers in Siyane Korale (Colombo District) that came in later are similar in organisation. The first major stride however came with the setting up of the All-Ceylon Agricultural Producers' Union with the nucleus of the societies in Welimada and Palugama which is one of the principal areas that produce up-country vegetables. This Union has taken on the task of disposal of agricultural produce as well. In addition to their wholesale floor and the retail outlets operated in Colombo they have opened up wholesale outlets in a few provincial and district towns as well and have plans to expand their sales activities through the Island in the course of the next few years. It is expected of the co-operative sector, particularly the All-Ceylon Agricultural Producers' Union to play a vital role in the field of planned production and in the task of achieving an even distribution of vegetables and fruits throughout the Island.

6. Thus the picture today is: (i) the private sector operating mainly through Commission Agents who collect the produce of the unorganised individual cultivators and dispose of this produce to the retail trade presumably at prices determined by demand and supply, (ii) the co-operative sector that has organised cultivations through their scheme of cultivation loans and dispose of the produce on a system as is done by the private sector or produce and dispose of the commodity on an agreed basis as is done in the case of plantains and pineapples and (iii) the Marketing Department that buys produce from registered producers at prices determined from time to time on the basis of the ruling prices in the private sector and dispose of this produce through its selling points and by supplies to institutions.

7. The Development plan that is envisaged takes into account the activities of all these three sectors. A further phase in the scheme of development will be that of planned production. Although no expenditure is included in the present programme of work for that phase of activity a scheme of work relating to planned production will be outlined later on in this report in order to have a composite picture in respect of Marketing. In addition local bodies which though they do not come into the scheme as trading partners have to be taken into reckoning as they have a vital role to play as the authorities for providing and regulating trading establishments for use by all those who are engaged in this trade.

8. The private sector as has been pointed out earlier controls about 70 per cent. of the trade. Today much of the produce flows to Colombo. During the season more than three hundred tons of vegetables and

fruits come to the private sector wholesale markets alone and over 50 per cent. of this quantity is all vegetables. The actual requirements of Colombo city are about 78 tons of vegetables a day, so that the rest is either absorbed by the satellite towns or is reconsigned to outstations. The Municipal wholesale market in Colombo is controlled by Commission Agents. Similar wholesale markets operate in Kandy and Galle though on a smaller scale. From a geographical point of view a similar wholesale market should have operated in Jaffna too, but so far that does not seem to have happened.

9. So long as we recognise the existence of a private sector it is imperative that there be proper wholesale markets to which produce can be consigned conveniently and where transactions can take place in an atmosphere of competition. In this connection the biggest defaulter has been the city of Colombo. The principal wholesale market for vegetables and fruits in the city is situated at Kachcheri Road, Pettah, one of the most congested areas of the city. The actual market area comprises two buildings together having a floor area of about 25,000 square feet. It is in this space that about three hundred tons of vegetables are handled in a day in season. The result is that business in this place is conducted under strenuous conditions : there is no cleaning or grading of vegetables, there is no display of vegetables and there are no facilities for the customer to pick and choose his purchases. Conditions in the market are made worse by the interference from other Pettah bound traffic and consequently a vehicle that arrives late has to park itself about half a mile away from the market. On account of the congestion in and around the market not only have bags of vegetables to be carried head-load over long distances, very often the lorries that bring the produce have to act as temporary warehouses till such time as the produce is disposed of. The congestion results not only in vehicles spending unusually long hours arriving at the market traversing narrow and congested streets and waiting longer hours to discharge their cargo, it has also resulted in unnecessary deterioration in the condition of the produce that has to be kept in vehicles which are not the best warehouses for vegetables and fruits. Besides the loss in traffic hours the actual loss on produce is considerable, sometimes the loss on account of deterioration going up to as much as 50 per cent. It has been difficult to estimate what the actual loss is due to the congestion in the market. It is reasonable to allow a margin of about 20 per cent. for damage in transit and deterioration due to climatic factors. If so the 30 per cent. waste due to congestion in the market is almost catastrophic. In the Covent Garden Market, waste due to congestion was estimated at 5 per cent. and this was considered avoidable waste which weighed heavily in favour of shifting the market to a new site.

10. A smaller wholesale market exists in Grandpass in the nature of a daily fair for green leaves. The actual place of business is round the Municipal retail market with producers displaying their wares even on a part of the road. The co-operative wholesale market is in Saunders Place, again in the Pettah and although the conditions in this place are not so bad as in the other two places the location does not lend itself to further expansion at this point.

11. That Colombo needs a proper wholesale market for vegetables and fruits cannot be denied. Considering the minimum space required for a wholesale market, none of the existing sites is adequate for the purpose. Of course adjustments and make shift arrangements may be possible, but that will be quite expensive considering that all these markets are situated in places where land values are the highest in the city. There is no alternative to shifting the present wholesale market from Kachcheri Road and that will give an opportunity to build an up-to-date new market and bring under one roof all those who are engaged in wholesale transactions in the city. Proposals are being submitted to the Ministry regarding a suitable location for the new market. The expenditure on the new market scheme has roughly been estimated at Rs. 10 million. Building markets is a function of the local authority, but the Municipal Council will not be able to find the necessary money on its own. Assistance of the Central Government by way of a grant or loan is absolutely necessary if we are to achieve this objective. Incidentally, in other countries, new market schemes were financed by banks or state finance institutions or funds were raised through the issue of debentures. The principal items of expenditure will be on (*a*) the preparation of the site, (*b*) construction of roadways and parking spaces and (*c*) construction of buildings. The expenditure component is expected to be something like 50 per cent. foreign and 50 per cent. local for buildings and 40 per cent. foreign and 60 per cent. local for roadways, &c. A properly equipped wholesale market will have facilities for cold storage smoke rooms and other ancillary equipment where the foreign expenditure component will be higher. It will therefore be approximately correct to assume that the expenditure on the entire project will be equally divided between foreign and local costs.

12. Of the other cities that require wholesale facilities on this scale, Kandy has built a new market only recently. Although the facilities provided for wholesale transactions in the new market at Kandy show both lack of planning and fore-sight it will be difficult at this stage to induce the Kandy Municipal Council to undertake a new and separate project. In the meantime the Producers' Union too

has opened a new wholesale floor in Peradeniya, so that although the conditions are not the ideal it can be considered that Kandy has at least the basic facilities.

13. The conditions at the wholesale market at Galle are far from satisfactory while at Jaffna there is no wholesale market at all. To complete the requirements of wholesale markets on a geographical basis, each market commanding a separate region it will be necessary to have similar markets in Galle and Jaffna as well. Since these towns do not require markets on the same scale as Colombo, it is not expected that each of these projects will cost more than Rs. 2½ millions. The expenditure can be broken in the same ratio as in the Colombo project between local and foreign costs.

14. The wastes that were referred to at the wholesale level do take place on a smaller scale at the retail level too where the market facilities are inadequate. Some towns have in the recent past built new markets as in Kandy and Anuradhapura while in some other towns like Kurunegala, Gampola, Matara and Batticaloa such markets are in the process of construction. Some towns have actually earmarked lands and even prepared designs and specifications for new markets and are awaiting better times to find the necessary finances. Other local bodies will be induced to undertake such ventures if they have the assurance of funds. Actually the facilities for retail trade in vegetables and fruits in most of our towns are woefully inadequate. It is sometimes interesting to study the development of these retail markets. Where there have been markets built, they had been built decades ago when the population in those towns were a fraction of what they are today. The markets had been designed for the population of a by-gone age and they serve todays population with congestion within and around the markets, very often parts of public roads having been tacitly allowed to serve the purpose of market stalls. Even if there are protests they have always been on account of the obstruction caused to vehicles and pedestrians but no one has even inquired into the extent of waste on account of bad display and storage caused by lack of space. Such waste is certainly an important factor and that is waste that can be avoided. Where there are no markets that have been built these facilities are provided in make shift shanties which have been given the status of retail markets through usage. A good example of such a market are the shanties alongside Highlevel road at Kirilaponne. No information is available as to how many local bodies would be willing to construct new markets. But it is known that whenever finances permitted, no local body had been disinclined to undertake these projects. It can be safely assumed that if funds are forthcoming there is scope for

building even as many as fifty new markets in the Island. Of course the size of the market will vary according to the needs of each town. A large city may have to spend nearly Rs. 2 millions for a retail market, while a smaller town can manage such a project with a couple of lakhs of rupees. A mean figure of Rs. 500,000 can therefore be assumed as the expenditure and it is recommended that ten such market projects be included. The cost on the scheme of retail markets would therefore be Rs. 5 millions with about half that much being the foreign expenditure component.

15. Another feature of private sector activity in vegetables and fruits has been the system of fairs. Most of them are weekly fairs and their origin has always been as places to which cultivators brought their produce weekly. Such places are patronised by both consumers and traders. Of course these fairs are not always confined to agricultural produce alone as the concourse of people at these points have attracted even other traders ranging from those dealing in dry provisions to textiles and brass-ware. Some of these fairs specialise on items like for instance plantains while generally most of them have the whole range of vegetables and fruits both grown locally and brought from outside. Very often one can see at a fair a cultivator who brings some low-country vegetables buying up-country vegetables from a trader who has brought it there; similarly one can see a trader selling some produce or wares he has brought from outside and himself buying the produce that is brought there. In fact a fine chain of weekly fairs operates in the North-Western province where the produce bought at one fair is disposed of at the next fair and so on with the trader shifting from fair to fair in a chain through the week. These traders also have their Commission Agents in Colombo to whom they consign the goods that for obvious reasons cannot be disposed of in this chain of fairs. It is difficult to define the scope of these fairs as places to which cultivators bring their produce for sale or to places where they come to exchange goods or to places where consumers come to make their purchases or to places where traders come to buy up the produce. All this complex of activity takes place in a fair and therefore they foster a spirit of competition at any rate more than that can be found in the other markets. Although the idea of fairs may seem somewhat outdated, as has been pointed out earlier the atmosphere for free competition is more

pronounced at those places and both producers and consumers get a better deal at them. The system of fairs seems to be in the tradition of our people suggested by the 346 such fairs distributed among the Districts as follows :—

District	*No. of Weekly Fairs*
Colombo	77
Kalutara	16
Kandy	15
Matale	8
Nuwara Eliya	12
Galle	22
Matara	25
Hambantota	10
Kurunegala	34
Puttalam	23
Anuradhapura	11
Polonnaruwa	2
Badulla	6
Moneragala	15
Ratnapura	20
Kegalla	23
Jaffna	17
Mannar	None
Vavuniya	None
Trincomalee	2
Batticaloa	4
Amparai	2

16. Some local bodies have been anxious to organise such additional fairs but have been prevented from doing so on account of the lack of funds. All that is necessary for a fair is about an acre of land and some open structures which would not cost more than Rs. 15,000. The need for fairs is very often in the rural areas where the local village committees cannot undertake these ventures as their funds do not permit them to incur this expenditure. If these sums can be provided by way of loans the local bodies should be able to repay them through the levies they can make on the traders who patronise these fairs. Another aspect that is worth considering is that these fairs have hitherto emphasised the angle of producers' hence their greater incidence in producer areas. There is a case for developing such fairs from the consumer angle too. In fact the popularity of the few fairs where the consumer angle is more pronounced as in the case of the fairs at Nugegoda and Maharagama suggests that this is a scheme worth-while expanding. It commends itself for serious consideration on account of the negligible outlay which in itself is recoverable. It is recommended that provision be made for at least one additional fair in each District including two new fairs for the two Districts

that have none. In practically all these cases land will have to be acquired for the purpose. The average cost of acquiring an acre of land would be in the region of Rs. 10,000 and the cost of structures would not exceed Rs. 15,000. The structures that are necessary will be open sheds with zinc or asbestos roofs supported on a metal frame-work. The foreign expenditure component of such structures will be fairly high—say Rs. 10,000 of the Rs. 15,000 cost. Thus the total expenditure of Rs. 20,000 can be split equally between local and foreign expenditure. The total cost of this scheme will be in the region of Rs. 500,000.

17. The co-operative sector has entered the field of marketing only recently. Hitherto the impression that has gained currency in some quarters is that the Co-operative movement is another organisation for providing fair price stalls which have come to be regarded as the one method of fighting the high cost of living. We expect to utilise the Co-operative movement to play a far more important role in the field of marketing. In fact to our thinking the operation of a chain of retail outlets can at best be only a subsidiary function of this movement. It is expected that as a movement that has a hand in organised cultivation we can utilise the Co-operatives to contribute appreciably towards achieving an even distribution of commodities throughout the island and helping generally to stabilise prices. In other words we expect that the Co-operative sector will help to reduce the pressure on traditional markets during gluts by transferring its produce to areas that are in the secondary stage of supplies and even adopting a measure of planned production so as to shift the cultivations to different regions with a view to avoiding seasonal fluctuations.

18. The second aspect is by its nature complicated and there is no easy road to achieving it in a short time. We are however confident that through the operation of wholesale floors in different regions the Co-operative sector can help to achieve an even distribution of commodities, prevent the unnecessary movement of produce back and forth as is happening in the private sector today and help to relieve the glut in the traditional markets during the season. To pursue this programme the co-operative movement will require funds to set up additional wholesale floors, set up new or strengthen the existing producer co-operatives and more than everything else add to its present fleet of vehicles which is an absolute necessity.

19. The present organisation in the co-operative sector for the production and marketing of vegetables and fruits is the All-Ceylon Agricultural Producers' Union. This is a secondary organisation with

islandwide membership of primary societies. It was registered in 1961 with an initial membership of 12 societies and has as its main objects the wholesale marketing of vegetables and the provision of connected services. The following statistics show its growth of business during the last 3 years :—

Period	*Membership*	*Share Capital*		*Value*		*Profit*	
		Rs.	*c.*	*Rs.*	*c.*	*Rs.*	*c.*
1961/62	85	5,303	00	1,344,403	98	20,669	81
1962/63	86	10,913	84	2,166,945	16	4,661	14
1963/64	186	45,341	34	2,244,354	03	876	87

20. The organisational set up of the Union has also expanded during this short period to keep up with the increasing volume of business. In 1961/62 the wholesale depot in Colombo was opened and these wholesale facilities were expanded to Kurunegala and Peradeniya in 1962/63, to Panadura and Galle in 1963/64 and to Matara, Nuwara Eliya, Bandarawela, Anuradhapura and Jaffna in 1964/65. The overall result of these efforts is that the Producers' Union now maintains a high turnover which amounts to about 25 per cent. of the Island's marketed quantity of vegetables. In the course of the next few years the Producers' Union proposes to strengthen its existing organisation by improving the existing points for collection and disposal and adding new ones. The proposals are as follows :—

	Rs.
(1) Central wholesale market, go-downs and offices—Colombo—included under the wholesale market scheme for the city of Colombo	—
(2) Wholesale floor—Kirillapone	50,000
(3) Modern equipment for loading, unloading, packing and processing	100,000
(4) Up-to-date collection and supply centres with modern equipment at Palugama, Uva-Paranagama, Nuwara Eliya, Matale, Hanguranketa and Hewaheta at Rs. 50,000 each centre	300,000
(5) Improvement of existing facilities at Peradeniya	25,000
(6) Provision of up-to-date wholesale markets at Kurunegala, Kegalle, Ratnapura, Mannar, Trincomalee, Batticaloa, Negombo and Polonnaruwa, at Rs. 50,000 each	400,000
(7) Wholesale markets at Galle and Jaffna—included in the schemes under the respective local bodies	—
(8) Improvement of existing facilities at Matara, Anuradhapura and Panadura at Rs. 25,000 each	75,000
(9) Provision for transport—100 vans, lorries and land rovers	3,000,000
(10) Provision for radio, telephone system	125,000
	4,075,000

The expenditure on improvements necessary for the co-operative sector will very roughly be divided in the ratio of 50 : 50 between local and foreign costs.

21. In the task of providing the Island with a streamlined marketing organisation the chief responsibility of the Marketing Department should be that of guiding and regulating the other agencies that are engaged in this task. As was pointed out earlier, hitherto emphasis had been laid even when considering this problem, only on the distribution aspect of marketing. But as has been already pointed out, a marketing scheme must necessarily take into reckoning the production aspect as well.

22. So far no accurate statistical data has been either collected or analysed in relation to the production and marketing of vegetables. The figures given here may vary slightly from those presented in other reports where this subject has been discussed. However these differences do not affect the principal conclusions. The Island's daily requirements of vegetables is about 1,800 tons in all popular varieties. This means that the total annual produce of 600 acres has to come to the market daily to satisfy the consumer requirements. The problem is that this tonnage has to be produced in different regions at different times ranging over about 50 different major groups of vegetables. To ensure a regular supply it is necessary to have approximately 200,000 acres under cultivation with due regard to varieties and seasons. At present the total acreage under cultivation in all varieties is about the extent that is necessary to keep the market in supply at the present level of demand. However the uneven distribution of the cultivated extent among different varieties and regions results in both gluts and shortages of different varieties at different times. The task in planning is therefore to spread the cultivation of these 200,000 acres among the different regions and varieties so as to keep the consumer market in supply. Of course no amount of planning can insure us against the vagaries of weather which seem to affect the level of production of vegetables more often than other produce so that with the best efforts certain maladjustments arising from factors beyond human control cannot be altogether ruled out. In this connection it might also be pointed out that in the wide range of consumer preference extending to about fifty varieties of vegetables the marketing task is practically one of maintaining a daily link between the producer and consumer so that any unusual conditions will have an immediate repercussion in the day's market condition.

23. There had been no co-ordinating authority hitherto to either fix targets for different lines of production or to distribute the cultivated extent among the different regions and varieties. On the

assumption that the extent under cultivation is sufficient to meet the present demand what remains to be done on the production front is essentially to make adjustments in the cultivation programmes.

24. Till the All-Ceylon Producers' Union came into the scheme with its system of loans to primary societies, there had been no effort to organise cultivation of vegetables in the peasant sector; and the production of vegetables has essentially been a function of the peasant sector. In this scheme it is not hoped to bring the entire peasant sector under the co-operative movement as this would be a very near impossible task. However, the extension of the co-operative sphere to a substantial extent of the entire acreage will help to achieve that degree of planning which will be necessary to ensure the even flow of vegetables of the different varieties to the consumer-market. The scheme of production of the Producers' Union was inaugurated in April 1964. 56 societies were selected as project areas, but out of this, 30 schemes were implemented. In all, loans amounting to Rs. 216,000 were granted for production. Some of these schemes were an outstanding success. It is proposed in the course of the next few years to extend the production scheme of the All-Ceylon Producers' Union.

25. Along with the extension of the loan schemes of the Producers' Union the co-operative sector will be geared to a more positive scheme of planned production starting from village level through the district organisation going up to the national level where it is proposed to set up a development committee that will consider a national plan taking into account the activities of the co-operative sector, the estates sector that has been brought into this scheme recently and the unorganised private sector.

26. The Central Development Committee will consist of representatives of the Departments of Agriculture, Marketing, Co-operatives, the People's Bank and nominees of other organisations like the estates sector which will study the implementation programme that is necessary to keep the consumer market in supply. This committee, once it has decided on the implementation programme required at a national level will pass down the information to similar organisations at district level, which will again function in the capacity of co-ordinating committees for the district but with a greater degree

of popular representation than the central committee and final implementation will be at village level which will be popular organisations of the cultivators themselves advised and directed on technical and other matters by officers from the respective departments.

27. As the co-ordinating authority it will also be a primary function of the Marketing Department to engage itself in those activities that are necessary to guide and regulate the different agencies engaged in these tasks. A scheme of market intelligence to ascertain the varieties in demand and supply, a scheme of marketing research to help lay down standards for packs and grades and ascertain ways of keeping vegetables over long periods and the undertaking of constant surveys to gather the most up-to-date information will necessarily have to be undertaken by such co-ordinating authority.

28. The Department has also however maintained a skeleton service both for the collection and sale of agricultural produce. There is no getting away from this aspect of work however small its scale of operations and however negligible its impact has been on the market conditions. Other than the difficulty of retreating from this position in the face of persistent demands for expanding the scale of these operations the scheme commends itself for continuation on a limited scale for giving a practical bias to an organisation that is expected to guide and regulate the other agencies that are engaged in this task. Besides, it will be a Government Organisation that will have to take remedial action to off-set seasonal fluctuations through such measures as the processing of produce and the cold storage of whatever other produce than can be preserved in this form. To provide these general services, it will be necessary for the Department to maintain its present scheme of collection and disposal of produce. The scheme of development for the Department is therefore to improve and add to the existing facilities that are there for (i) the collection and disposal of produce, (ii) for the cold storage of produce, and (iii) for the processing of agricultural produce.

29. The Department's collections are made through 29 collecting centres scattered in different regions of the Island. Similarly it has 41 sales outlets and in addition maintains a number of units to supply provisions to Government hospitals. Some of the collecting centres are mere sheds and very often during the season the Department is unable to collect as much as produce as it would wish to, as the volume it can handle is limited to the quantity that can be transported each day. In some towns the Department has all its units functioning, but in different places as it has not been possible to find sufficient accommodation to house all these units under one roof.

Consequently supervision of the activities among the different units has become difficult and very often unnecessary time is spent on travelling between different units and transporting goods from one unit to another. In the course of the next few years it is proposed to put up buildings in as many centres as possible with a view to either improving the existing accommodation or of combining the different scattered units. The programme that is envisaged is as follows :—

Place		Proposal	Estimated expenditure
			Rs.
(1) Anuradhapura	..	Office, Hospital Supply Branch and Vegetable Collecting Centre	200,000
(2) Galle	..	Office, V. P. S. shop and H. S. B. ..	250,000
(3) Matara	..	V. P. S. shop and H. S. B. ..	75,000
(4) Tangalle	..	V. P. S. shop and H. S. B. ..	75,000
(5) Hambantota	..	Shop and H. S. B. ..	50,000
(6) Tissamaharama	..	Shop, V. P. S. and H. S. B. ..	75,000
(7) Kataragama	..	Shop, H. S. B. Restaurant and Kitchen ..	100,000
(8) Kurunegala	..	Office, V. P. S. and H. S. B. ..	75,000
(9) Kandy	..	Office, V. P. S. and H. S. B. ..	75,000
(10) Bandarawela	..	Office, V. P. S., H. S. B. and shop ..	250,000
(11) Vavuniya	..	Shop, V. P. S. and H. S. B. ..	75,000
(12) Mannar	..	Shop and H. S. B. ..	50,000
(13) Batticaloa	..	Office, H. S. B. and V. P. S. ..	200,000
(14) Embilipitiya	..	V. P. S. and shop ..	50,000
			1,600,000

The expenditure between local and foreign cost is likely to be divided in the ratio of 50 : 50.

30. The cold storage capacity of the Marketing Department today is as follows: Kandy 250 tons, Lotus Road, Colombo 1,000 tons and Tripoli Market, Colombo 100 tons. Of these cold stores, Kandy is the only up-to-date one equipped with humidity control. Proposals are under way to convert part of the capacity of the Lotus Road Cold Rooms to humidity control so as to make it suitable for the storage of vegetables and fruits over a longer period. At present the two cold rooms in Colombo are utilised practically for the purpose of keeping vegetables and fruits overnight. There are proposals to set up new cold rooms in other centres as well, but action on these proposals has been deferred till the economics of cold room projects in the island have been examined. On our present state of knowledge

we know that only a few items of up-country vegetables can be kept in cold storage and so far we have not been able to ascertain whether keeping vegetables and fruits in cold storage is an economic feasibility. If the scheme for cold rooms proves a successful venture, in addition to the towns of Kurunegala, Anuradhapura, Galle and Matara for which these projects had been approved earlier, it will be necessary to include Jaffna as well to give the Island a net-work of cold rooms in the principal cities of the different regions. If our experience shows that cold rooms are not an economic feasibility then we will proceed with only the conversion of the Lotus Road Cold Rooms. The cost of the entire project for cold rooms is as follows :—

	Rs.
(1) Conversion of the Lotus Road Cold Rooms	300,000
(2) Kurunegala—250 ton capacity new cold room ..	1,400,000
(3) Anuradhapura	1,400,000
(4) Galle	1,400,000
(5) Matara	1,400,000
(6) Jaffna	1,400,000
	7,300,000

This expenditure will be divided in the ratio of 60 local and 40 foreign costs.

31. One of the serious difficulties the Marketing Department has in the expeditious handling of produce is the inadequacy of transport. The Department's present fleet of vehicles for handling produce is 134 lorries. These vehicles have to be utilised for the transport of produce from the Collecting Centres to the distribution points, to supply goods to the different sales points and to collect and supply provisions to hospitals. It is proposed in the course of the next few years to add to the present fleet at least another 100 vehicles. With the increase in the fleet the present repair and service station will have to be strengthened. The cost of buildings in the central workshop will be about Rs. 150,000 and the cost of 100 vehicles will be about Rs. 2,250,000. Of the total expenditure of Rs. 2,400,000 on transport the local cost on vehicles will be Rs. 500,000 and on the building Rs. 75,000. Thus the foreign cost on this item will be Rs. 1,825,000.

32. The present capacity of the canning factory is limited to handling 15,000 fruits a day. Machinery is already on order to increase this capacity three fold to 45,000 fruits a day. The development

programme that is envisaged is to double the capacity after we have achieved the target of 45,000 fruits a day. The main line of production of the factory is pineapples. However this produce is seasonal and during the rest of the year the factory has to be kept working on other produce. During the period that pineapples do not come to the factory, a variety of other fruits out of which jams, cordials and juice are made are obtained. Along with the expansion of the pineappleline it is proposed to increase the capacity of the other lines as well. The scheme is as follows :—

Nature of produce	*Present capacity*	*Future capacity*	*Cost* *Rs.*
(1) Citrus	15,000 fruits a day	50,000 fruits a day	217,000
(2) Jam making line	15,000 lbs. a day	50,000 lbs. a day	715,000
(3) Sauce	4,000 lbs. a day	8,000 lbs. a day	40,000
(4) Pineapple line	45,000 fruits a day (next year)	90,000 fruits a day	500,000
			1,472,000

The four items shown above give the expenditure necessary for machinery and equipment that has to be imported. Therefore, the whole amount will be foreign expenditure.

33. Along with the canning of fruits the factory also grinds and packets chillies and curry powder. A small quantity of the curry powder that is ground here is exported. The rest of the curry powder and chillies are sold in the local market. There is a very heavy demand for both these items. There is of course the convenience to the housewife of buying these items in packeted form and there is also the factor of keeping these items in stock so as to meet any contingencies created by delays or disruption in imports. The prices of chillies and condiments fluctuate in the world market and it will be possible to take advantage of lower prices in the world market by importing large stocks of these items which can be packeted and kept in stock. The present capacity of the grinding machinery is 5 cwts. a day and it is proposed to increase this ten fold over the next few years. The machinery that is in use now is outdated and it is proposed to take advantage of the expansion scheme to obtain modern machinery for this purpose. The cost of this expanded programme is estimated to be Rs. 675,000 much of much will be foreign expenditure as the machinery and equipment has to be imported. Of this sum Rs. 350,000 is the estimated cost of buildings of which roughly Rs. 175,000 will be local costs. Therefore the foreign expenditure component in this item will be Rs. 500,000.

34. The expansion of the main factory for fruits will also require additional buildings to house the machinery, stores, welfare buildings and vehicles. The total cost of these buildings and six vehicles is estimated at Rs. 1,602,500 of which roughly the foreign exchange component will be 50 per cent.

35. It is also proposed to have a cold room of 100 tons capacity attached to the factory. Very often during the season large quantities of fruits are received and these have to be kept stacked in the factory till such time as the processing lines can take them. There is considerable waste resulting from bad storage and the only way of avoiding this waste is to keep the excess quantities in cold storage. It is estimated that a cold room of 100 tons capacity will cost about Rs. 600,000 of which about Rs. 250,000 will be the foreign exchange component and Rs. 350,000 local costs.

36. There are also two institutions: the Kitchen and Bakery, maintained by the Marketing Department. Although these two institutions do not fall into the general picture of the marketing organisation of the country it is proposed to modernise these two institutions. The Kitchen prepares about 10,000 meals a day, much of which is supplied to the Colombo Port Commission. In fact this service can be provided by the Colombo Port Commission itself except that there are special occasions as during floods and festivals when it becomes necessary for the Department to provide a catering service. The Kitchen is located on a land belonging to the Medical Research Institute and already there are requests to make this land available to that Institute to enable it to expand. It is hoped eventually to induce the Port Commission to make its own catering arrangements. Thereafter it is proposed to maintain a kitchen with a capacity of about 2,000 meals a day and this organisation will give us the nucleus of staff required for handling any emergency services. Similarly, the bakery too is out-dated and it is proposed to have a bakery of about 2,000 lbs. a day capacity when we can find the money to build a new bakery. Both these institutions will cost about Rs. 1,500,000 (a part of the equipment now available in the bakery can be used) of which the foreign exchange component will be about a million rupees.

Summary

37. The Marketing Organisation for the Island is provided mainly by the private sector and the Co-operative movement. The development proposals envisage the creating of necessary facilities for these organisations to operate in an atmosphere of competition.

38. Of the suggested schemes only the cold rooms project had been previously approved by Government. Proposals regarding a wholesale market for Colombo have been made to the Ministry and this project is now being considered by a committee appointed by the Permanent Secretary. None of the other proposals have been submitted to Government so far. It is difficult at this stage to phase out this programme of work, more particularly as some items of expenditure concern other organisations like the local bodies.

39. The direct employment generated by these schemes can be estimated only in so far as they relate to the work of the factory. The present number of hands employed at the factory is about 150 ; after the expansion it is expected that the number of employees in the factory will rise to 500. As a result of the expanded capacity of the factory there will certainly be some form of increased indirect employment particularly through increased cultivation and the existence of an assured market. However it is difficult to give an estimate of such indirect employment.

40. The main purpose in providing a stream-lined Marketing Organisation is to ensure to the cultivator a ready market for his produce and to the consumer commodities at a reasonable price. The inherent defects in the present system result in much waste in unnecessary handling, transport and bad schemes of distribution. Consequently the trading margins on agricultural produce are very high in the country today. A better Marketing Organisation will help to reduce these margins which inevitably must result in a gain to both the producer and the consumer. These schemes, once they are in full operation will help to raise the level of income of the peasants on the one side and help reduce the cost of living on the other.

41. A separate statement showing the break-up of expenditure is annexed.

SUMMARY OF EXPENDITURE

Scheme	Foreign costs Rs.	Local costs Rs.	Total costs Rs.
(A) Private sector—funds to be provided to Local Bodies :			
(1) Wholesale Market, Colombo	5,000,000	5,000,000	10,000,000
(2) Wholesale Market, Galle	1,250,000	1,250,000	2,500,000
(3) Wholesale Market, Jaffna	1,250,000	1,250,000	2,500,000
(4) Ten (10) retail markets	2,500,000	2,500,000	5,000,000
(5) Twenty-two (22) weekly fairs	250,000	250,000	500,000
	10,250,000	10,250,000	20,500,000
(B) Co-operative sector :			
Improvements to existing Collection and Sales points, establishing new units, modernising equipment, additions to the transport fleet and improved telecommunication	2,037,500	2,037,500	4,075,000
(C) Government Sector :			
(1) Fourteen (14) Departmental units	800,000	800,000	1,600,000
(2) Cold rooms—five units and improving an existing unit	2,920,000	4,380,000	7,300,000
(3) Transport—100 lorries and improvements to Central Workshop	1,825,000	575,000	2,400,000
(4) Machinery and equipment for Canning Factory	1,472,000	—	1,472,000
(5) Machinery and buildings for grinding chillies and condiments	500,000	175,000	675,000
(6) Buildings and vehicles (6) to the canning Factory	801,250	801,250	1,602,500
(7) 100 tons capacity Cold Rooms for canning factory	250,000	350,000	600,000
(8) Improvements to the Kitchen and Bakery	1,000,000	500,000	1,500,000
	9,568,250	7,581,250	17,149,500

	Rs.
(A) Total expenditure on the private sector	20,500,000
(B) Total expenditure on the Co-operative sector	4,075,000
(C) Total expenditure on the Government sector	17,149,500
	41,724,500

6

Milk Production

MILK PRODUCTION

In 1964 Ceylon imported 93.28 million rupees worth of milk products. According to a survey made in 1963 the per capita consumption of milk was only 2 ozs. per day as compared to over 20 ozs. per day in developed countries. The development of milk production is, therefore, necessary not only for the purpose of saving foreign exchange but also to increase the per capita consumption of milk in order to build a healthier nation.

The potentialities for milk production in Ceylon are considerable. The hill country zone is ideally suitable for temperate breeds of cattle and offers excellent avenues for dairy farming. This area lends itself to intensive methods of cattle rearing and sufficient land is available to produce enough milk to off-set present imports of powdered milk. High yielding dairy cows of European breeds are already being successfully maintained on Kikuyu grass which has been established in the patnas in this area.

Extensive natural grasslands suitable for development of a meat and milk industry are available in the Tamankaduwa district of the Dry Zone. The Tamankaduwa district has been known for a long time as good "cattle country" but until a few years ago no real attempt has been made to explore efficiently these potentialities. There are numerous references to the vast extent of luxuriant grazing grounds and large herds of good draught cattle in this area in early reports on animal husbandry development. Development of animal husbandry in this area was first embarked on by the then Minister of Agriculture, the late Hon'ble D. S. Senanayake by opening up a Government cattle farm at Polonnaruwa. There are an estimated 200,000 acres of natural grassland in the form of parklands and villus on either side of the Mahaweli river extending from Minipe to Trincomalee. The villus are inundated for three months of the year, when it is necessary to move the cattle to highland. On the basis of our experience at the Tamankaduwa Livestock Project the carrying capacity of this area is approximately one acre per animal.

The dry zone also has an estimated 1.8 million acres of land which can be utilised for the establishment of unirrigated pasture. There are, in addition, good prospects for dairy farming in the 1.1 million acres under coconut. The carrying capacity of pastures under coconut is approximately an animal per three acres.

In addition to these physical resources Ceylon has an estimated 1.59 million head of indigenous cattle and 0.85 million buffaloes which although basically poor milk producers, can serve as a base for a development programme.

With regard to animal feed, Ceylon has substantial quantities of coconut cake which can be made available for the formulation of livestock rations. The capacity of the provender plant of the Ceylon Oils & Fats Corporation is 3,000 tons per month and the present output is 1,300 tons of poultry feed and 1,200 tons of cattle feed per month.

In order to exploit these resources, the Government has already invested an estimated 80 million rupees during the last 25 years on the following programmes :—

(1) The establishment of large nucleus herds consisting of pure bred Friesians, Ayrshires, Jerseys and Dairy Shorthorns in the hill country zone.

(2) The establishment of a herd of Murrah buffaloes for utilization in a programme of upgrading indigenous buffaloes.

(3) The introduction and establishment of a drought resistant grass—*Bracharia brizantha*—over extensive areas in the dry zone.

(4) The establishment of several thousand acres under Kikuyu grass in the hill country zone.

(5) The initiation of a breeding programme using Jersey sires on indigenous cows with a view to evolving a milch animal to suit the dry zone environment.

(6) The establishment of an artificial insemination service and a veterinary extension service to meet the needs of an expanding livestock industry.

As a result of the implementation of these programmes the necessary technical and managerial skills have been acquired over the years. The farms already established in the different climatic zones of the country, carrying various breeds and types of animal, have served as a valuable training ground in the fields of animal and pasture management. Furthermore, a fairly well established division of animal husbandry already exists within the frame-work of the Department of Agriculture. The organizational chart of this division appears in Annexure 'A'.

There are 72 Veterinary Surgeons attached to this division, of whom 54 are in charge of disease control work in the field. All the vaccines and other biologicals necessary for the prevention and control of contagious diseases of cattle occurring in this country are manufactured locally. A new Veterinary Research Institute is under construction and it may be said that the skills necessary for the prevention and control of animal diseases are already available. Artificial insemination, first introduced in 1950, has been gradually expanded and last year a total of 8,500 animals were inseminated artificially through 33 sub centres. A programme of training field assistants in the techniques of artificial insemination is already in progress.

The programmes drawn up in the past for the exploitation of the resources mentioned above, have been for the long term development of animal husbandry. However, self-sufficiency in milk can be achieved in a short time by an intensification of these programmes as can be seen from the following example. In 1964 Ceylon imported 19 million rupees worth of condensed milk. In order to achieve self-sufficiency in this commodity, we need only about 8,500 cows, in addition to those available at Tamankaduwa. As stated earlier there are over 200,000 acres of natural grassland in this area. Suitable buffalo cows are available for immediate purchase in India and in Pakistan at Rs. 1,750 per animal. Therefore an investment of about 15 million rupees in foreign exchange can make Ceylon self-sufficient in condensed milk and immediately save a similar amount in foreign exchange *annually*.

The condensed milk factory which is being established under the aegis of the National Milk Board is expected to be in production by 1967. According to the terms of the agreement under which aid for this project is being supplied, we have to buy from the New Zealand Government the butter fat and skim milk necessary for reconstituting the entire requirements of the Island less the quantity of fresh milk that will be available to the factory. The daily requirements of fresh milk for the production of the entire butter fat requirements and half the S.N.F. requirements of the condensed milk now imported is 64,000 pints. In order to make the best use of the factory it will be necessary to step up the production of milk in the Tamankaduwa area immediately. The present daily production of milk at the Tamankaduwa Livestock Project is approximately 5,000 pints and to provide the extra milk, an extra total herd of about 8,500 buffalo cows will be required on the assumption that 70 per cent of the cows will be in milk at any time of the year. This has been calculated on a fairly low average yield of 10 pints per cow although the animals which Pakistan is prepared to supply at Rs. 1,750 each are claimed to yield an average of 24 pints of milk. Annexure 'G' gives the capital and recurrent costs of development phased over a 3 year period and based on units of 1,000 cows in milk. On the basis of our experience, a unit of this size is best managed in herds of 250 milking cows each, with the follower-stock being maintained separately. It is suggested that 4 units of 1,000 cows (2 in the private sector and 2 in Government farms) be established in 1966 and 2 units each in 1967 and 1968.

In 1964, Ceylon imported 11,896,957 lbs. of full cream milk powder valued at Rs. 26,897,502. In addition, milk foods and skim milk to the value of 15,905,456 rupees was also imported. Investigations are being made to assess the feasibility of establishing a spray-drying plant for the production of full cream milk powder at Ambawela. At present, the Government Livestock Farms at Ambawela and Bopatalawa produce about 11,000 pints of milk per day. A survey conducted by the National Milk Board indicates that at least a further 20,000 pints of milk can be collected daily from private sources in this area. Thus, the estimated 50,000 pints of milk per day required for the proposed spray-drying plant can be obtained by the importation of an additional total of 1,000 cows. Cows of the Jersey, Ayrshire, or Friesian breeds are suitable for the purpose and Annexure 'D' gives the capital and recurrent costs of the proposed scheme of development. It is proposed that these 1,000 cows be imported in two consignments of 500 each 1967 and 1968.

Milk produced at the Government Livestock farms at Tamankaduwa, Ambawela and Bopatalawa are now made available to the National Milk Board for sale as liquid milk. This amounts to approximately 16,000 pints per day at present. On the completion of the condensed milk factory at Polonnaruwa and the establishment of the proposed spray-drying plant at Ambawela the milk produced by the above farms will be diverted to these two factories. Likewise the milk now collected through the collecting centres of the National Milk Board in the hill country zone will be diverted to the spray-drying plant. It will be necessary therefore to find an alternate source, in as close proximity to the main liquid milk collecting centre as possible, for the supply of the shortfall of 36,000 pints of liquid milk per day to the National Milk Board when the above plants go into production.

It is proposed to intensify dairy farming in the coconut estates in the Colombo, Chilaw and Kurunegala districts to supply this demand. A large proportion of the 1.1 million acres under coconut falls within the districts mentioned above. The Coconut Research Institute has been conducting research over many years on the feasibility of rearing cattle under coconut and on the basis of their work pasture under coconut has a carrying capacity of approximately 3 acres per animal. Large private dairies already exist in this area such as those at Martin, Balagalla, Orange Grove, Serapis, Hawanella and Ragedera estates. These herds are owned by some of the most experienced privte livestock breeders and certain herds already produce over 1,000 pints of milk per day.

The milking animal traditionally reared in this area is a cross-bred but Sindhis, Tharparkas, Sahiwals or other pure bred animals of tropical milch breeds thrive just as well. Under the semi-intensive methods of cattle management practised on coconut estates, such an animal can be expected to produce an average of 10 pints of milk per day. On the basis of 70 per cent of the cows being in milk at any time, an additional 5,150 cows are required to produce 36,000 pints of milk a day. It has been estimated that a herd of 50 cows in milk together with the follower-stock can be maintained on a coconut estate of 250 to 300 acres. On estates where fodder can be grown, the extent of land required would, of course, be much less ; an acre of fodder can maintain up to 3 animals. It is also proposed that development of this area be left to private enterprise but that the Government afford the facilities necessary such as the release of foreign exchange, the establishment of satisfactory artificial insemination and veterinary services etc. Annexure 'E' gives the capital and recurrent expenditure for a unit of 50 cows in milk and follower-stock. As each unit will be producing 500 pints of milk per day, 72 such units will be necessary to produce 36,000 pints. It is proposed that foreign exchange be released for the purchase of 1,050 animals per year for 4 years and for the balance in the 5th year.

The additional staff directly required for the implementation of the above proposals is shown in Annexure 'G'. However, certain indirect services rendered at present, such as research, veterinary services, artificial insemination services, and administration will need strengthening if the full benefits of these proposals are to be obtained. It will also be necessary to establish a school of Animal Husbandry to train the additional staff required both for the private sector as well as the public sector to meet the needs of an expanded milk industry. The division of animal husbandry, constituted at present as shown in Annexure 'A', will also need reorganization. Dentailed proposals in this regard will form the basis of a separate memorandum.

ANNEXURE " A "

Chart showing the existing organization of the Division of Animal Production and Health

D.D. (A.P. & H.)

ADMINISTRATIVE OFFICERS & CLERICAL STAFF

G.M.(A.H.F.)   C.V.S.   L.O.   (2) R.O.A.G.   R.O.A.N.   L.R.O.   F.M. Tamankaduwa Project   F.M. C.L.R.S. Polonnaruwa

V.R.O.'S

A.I.(H.Q.)
F.MM.
(A.H.F.)—9

55
V.SS.

V.S.Q.S.
(2)

O.I.C.VET.
HOSPITAL

P.D.O.
F.M. (2)
Kundasale &
Karagoda-
Uyangoda
A.F.M.
Foreman
Conductors
Van driver
Field Asst.

A.F.M.
Foreman
Clerk
Store-keeper
Conductors
Van driver
Field Asst.

A.F.M.
Foreman
Clerk
Store-keeper
Conductors
Van driver
Field Asst.

A.F.MM.
(A.H.F.)—9

Store-
keeper

Manager,
Meat Stall,
Kollupitiya

V.F.D.

Dispensary
Labourers
Hospital
Attendants

Tractor operators   Drivers
Field Assts.
Vet. Conductors   Van drivers
Mobile Unit

O.I.C.(A.I.) Centres   O.I.C. Stud Centres

V.F.DD.
(120)   Vaccinators   Cutters Salesman Clerk

ANNEXURE "B"

Annual Imports of Milk and Milk Products, 1960–1964

	1960		*1961*		*1962*		*1963*		*1964*	
	Quantity (lb.)	*Value in Rs.*	*Quantity (lb.)*	*Value in Rs.*	*Quantity (lb.)*	*Value in Rs.*	*Quantity (lb.)*	*Value in Rs.*	*Quantity (lb.)*	*Value in Rs.*
Milk and Cream.	23,629	41,975	29,271	52,925	23,140	39,599	148,851	135,053	153,978	137,683
Full Cream Condensed milk	21,842,948	17,367,925	16,543,324	12,670,301	22,540,285	16,228,182	21,588,037	16,539,562	21,444,121	18,965,968
Milk Foods	6,805,424	14,853,668	5,595,756	12,735,662	5,124,676	11,715,533	6,378,396	14,948,372	6,177,459	14,579,067
Full Cream Milk Powder	5,209,478	11,738,530	7,118,287	15,308,479	94,38,446	18,797,637	9,562,371	21,888,384	11,896,957	26,897,502
Skim Milk	3,546,698	3,727,245	11,371,011	683,125	312,852	157,438	302,117	217,921	1,364,094	1,326,389
Butter	3,278,568	7,065,375	3,847,602	6,783,238	3,549,196	6,456,463	3,427,105	6,212,415	3,377,446	6,866,920
Ghee	701,815	1,494,165	1,005,673	2,039,443	588,540	962,760	322,138	652,701	566,457	1,157,741
Malted Milk	6,611,351	15,868,278	6,815,938	15,676,450	9,044,568	21,349,426	7,380,373	16,300,407	10,397,682	23,485,675
Dairy Products—other	14,980	26,813	16,036	28,309	215,941	416,394	67,290	125,554	—	—
Re-exports—Milk and Cream	157,700	194,071	187,740	187,740	102,539	97,029	97,140	122,510	103,898	136,542
Grand Total (*Less* re-export)	47,877,191	71,989,903	42,155,158	65,790,200	50,735,105	76,026,403	49,049,538	76,897,859	55,274,296	93,280,403

ANNEXURE "C"

Capital and Recurrent Expenditure in respect of a unit of 1,000 buffaloes in milk

	Capital Expenditure	*Total Cost* *Rs.*	*Foreign Exchange Component* *Rs.*
1.	Cost of 1,000 buffaloes	1,750,000	1,750,000
2.	„ 20 stud Bulls @ Rs. 2,500	50,000	50,000
3.	„ 1 milking parlour	200,000	35,000
4.	„ 1 Pregnant Shed	20,000	3,000
5.	„ 1 Cattle Food Store	15,000	2,000
6.	„ 1 Cattle crush	1,000	—
7.	„ 1 Sick bay	3,000	500
8.	„ 5 miles of gravel road	25,000	2,500
9.	„ 50 buckets and 50 milk pails	1,000	1,000
10.*	250 acres pasture development, clearing and stumping @ Rs. 250	62,000	—
	Planting @ Rs. 80	20,000	—
11.	Lorry	20,000	20,000
12.	Tractor and trailer	20,000	20,000
13.	Water service	20,000	10,000
14.	Electricity	25,000	10,000
15.	*Quarters*—		
	1 Manager's bungalow	25,000	5,000
	2 Stock Inspectors	20,000	5,000
	4 Conductors	20,000	5,000
	2 Field Assistants	10,000	2,000
	60 Labourers—8 labour cottages	64,000	12,000
	1 dormitory	40,000	6,000
	2 Watchers	16,000	3,000
	2 Veterinary Field Assistants	20,000	4,000
	1 Lorry Driver	8,000	2,000
	1 Tractor Operator	8,000	2,000
	1 Clerk	20,000	6,000
		2,483,000	1,956,000

---

* Calculated on the basis that for 9 months of the year natural villu pastures are available for grazing.

Memorandum on Milk Production

Correction to Annexure " C " (page 2)

		Rs.
1.	Cattle food for one year	325,893
2.	Incidentals	10,000
		335,893

	Staff	*Salary* Rs. c.	*C. L. A.* Rs. c.	*S. L. A.* Rs. c.
3.	Manager (A.I.)	1,980 00	1,219 20	420 00
4.	Stock Inspectors (2)	3,360 00	2,438 40	600 00
5.	Conductors (4)	4,344 00	4,574 40	840 00
6.	Field Assistants (2)	1,500 00	1,872 00	420 00
7.	Vet. Field DD. (2)	1,008 00	1,488 00	420 00
8.	Lorry Driver (1)	870 00	1,007 50	210 00
9.	Tractor operator (1)	750 00	940 00	210 00
10.	Watchers (2)	1,080 00	765 60	420 00
11.	Labourers (60)	28,800 00	43,200 00	12,600 00
12.	Clerk	960 00	1,068 00	210 00
		44,652 00	58,573 10	16,350 00

		Rs. c.	Rs. c.
15.	5,000 Gallons Fuel	6,500 00	
	(*a*) Capital Expenditure		2,483,000 00
	(*b*) Recurrent Expenditure		461,978 10
			2,944,968 10

INCOME AND EXPENDITURE

Heifers :

	Rs. c.
Expenditure :	
Cost of feeding, 5 pints whole milk daily until end of 2nd month—i.e. 300 pints at 25 cents each	75 00
Cost of feeding 6 pints skim milk daily from 2nd to 6th month—i.e. 720 pints at 15 cents per pint	108 00
Cost of feeding 2 lbs. concentrates daily form 6 months until 3 years of age—i.e. 1,800 lbs. at Rs. 340 per ton	273 00
Cost of feeding 2 ozs. mineral mixture per day for 3 years—i.e. 135 lbs. each at Rs. 600 per ton	36 00
Wages for 6 labourers for 3 years on per animal basis	78 00
	570 00
Actual value of heifer at purchase	1,500 00
Income :	
Approximate nett profit per heifer	900 00
Approximate nett profit from 315 heifers	283,500 00

Correction to Annexure " C "—(*contd.*)

Bull calves :	*Rs. c.*
Expenditure :	
Cost of milk and skim milk feeding until 6 months of age (same as for heifers)	183 00
Cost fo feeding 2 ozs. mineral mixture per animal per day for 3 years ..	36 00
Wages for 3 labourers for 3 years on per animal basis	39 00
	258 00

Live-weight of bull at 3 years is about 1,250 lbs.

Income :	
Presuming a 50 per cent. carcass weight 625 lbs. of meat at 90 cents per lb. ..	562 00
Approximate profit per bull	300 00
Profit from 315 bulls	94,500 00

(In the above calculations 10 per cent. calf mortality has been provided for)

Cows :

700 cows will be in milk at any time of the year in a herd of 1,000 cows

Presuming an average daily milk yield of 10 pints for a cow, 700 cows will produce 7, 000 pints of milk.

7,000 pints of milk valued at 25 cents per pint will bring an annual income of ..	638,750 00

ANNEXURE " D "

Capital and Recurrent Expenditure in respect of a herd of 1,000 Neat cattle in milk

	Total Cost	*Foreign Exchange*
	Rs.	*Rs.*
Cost of 1,000 cows	4,000,000 ..	4,000,000
Milking parlour	200,000 ..	35,000
Cattle sheds	200,000 ..	35,000
Pregnant shed	20,000 ..	3,000
Food Store	15,000 ..	2,000
Cattle crush	1,000 ..	—
Sick bay	3,000 ..	500
20 miles of gravel road	100,000 ..	10,000
50 buckets and 50 milk pails	1,000 ..	1,000
1,000 acres pasture (clearing, stumping and planting) ..	280,000 ..	—
Milking machines (4 sets)	60,000 ..	60,000
Lorry	20,000 ..	20,000
Tractor	10,000 ..	10,000
Water service	20,000 ..	10,000
Electricity	25,000 ..	10,000
	4,954,000	4,197,500

ANNEXURE "D"—(*contd.*)

	Total Cost	*Foreign Exchange*
	Rs.	*Rs.*
Quarters :		
Farm Manager's bungalow	25,000	5,000
Stock Inspectors (2)	20,000	5,000
Conductors (4)	20,000	5,000
Field Assistants (2)	10,000	2,000
Labourers (3)—4 Labour cottages	32,000	6,000
1 dormitory	30,000	6,000
Watchers (2)	16,000	3,000
Veterinary field Demonstrators (2)	10,000	2,000
Lorry driver (1)	8,000	2,000
Tractor driver (1)	8,000	2,000
Clerk (1)	10,000	3,000
	189,000	41,000
	4,954,000	4,197,500
	189,000	41,000
Total capital expenditure	5,143,000	4,238,500
Recurrent Expenditure :		
Cattle Food for one year	651,785	
Incidentals	10,000	
Fuel	6,500	
	668,285	

Staff	*Salary*	*C. L. A.*	*S. L. A.*
	Rs. c.	*Rs. c.*	*Rs. c.*
Manager (A. I)	1,980 00	1,219 20	420 00
Stock Inspectors (2)	3,360 00	2,438 40	600 00
Conductors (4)	4,344 00	4,574 40	840 00
Field Assistants (2)	1,500 00	1,872 00	420 00
Vet. Field DD (2)	1,008 00	1,488 00	420 00
Lorry Driver (1)	870 00	1,007 50	210 00
Tractor Operator (1)	750 0	940 00	210 00
Watchers (2)	1,080 00	765 60	420 00
Labourers (60)	28,800 00	43,200 00	12,600 00
Clerk	960 00	1,068 00	210 00
	44,652 00	58,573 10	16,350 00

Total Rs.	119,575 10
Capital expenditure	5,143,000 00
Recurrent expenditure	787,860 10
Total expenditure	5,930,860 10

Annual Revenue (Cattle)

1,000 cows provide 16,000 pints of milk at any one time of the year, presuming 80 percent to be in milk with a daily milk yield of 20 pints per cow. 16,000 pints per day at .25 cents per pint will bring in Rs. 4,000 per day × 365 = Rs. 1,460,000 per annum.

There will also be 400 heifer calves @ Rs. 100 each = Rs. 40,000.

In addition, annually 400 bull calves weighing approximately 800 to 900 lbs. of live weight each and 400 lbs. dressed weight will be available for meat supplies. The value of this at 90 cents a lb. will be Rs. 144,000.

	Rs.
The total income, therefore is :	1,460,000
	40,000
	144,000
	1,644,000

ANNEXURE " E"

Capital and Recurrent Expenditure in respect of a herd of 50 neat cattle in milk under coconut

	Total cost	*Foreign Exchange*
	Rs.	*Rs.*
Cost of 70 cows at Rs. 1,500 each	105,000 ..	105,000
Cattle shed	15,000 ..	3,000
Dispensary and sick bay	1,000 ..	—
Buckets, pails, etc.	1,200 ..	1,200
Drugs and instruments	1,000 ..	1,000
Cart	600 ..	—
Incidentals	1,000 ..	—
Planting 300 acres pasture at Rs. 25 per acre ..	7,500 ..	—
Water service	3,500 ..	3,000
Quarters :		
1 Conductor's quarters	10,000 ..	2,000
1 Twin labour cottage	5,000 ..	1,000
	150,800	116,200

Recurrent expenditure :

	Rs.
Cattle food	34,000
Incidentals	2,000
	36,000

Wages :

1 conductor	3,000
8 labourers	9,600
	12,600

	Rs.
Capital expenditure	150,000
Recurrent expenditure	48,600
	199,400

Annual Revenue

50 cows provide 500 pints of milk at any one time of the year. 500 pints per day at 35 cents per pint (delivered in Colombo) will bring in Rs. 175 per day × 365 = Rs. 63,875.

In addition, 20 bull calves would be available for sale at Rs. 70 each = Rs. 1,400 and also 8 heifers at Rs. 150 each = Rs. 1,200.

	Rs.
Total income is :	63,875
	1,400
	1,200
	66,475

ANNEXURE " F "

Statement of Annual Expenditure

	Capital Expenditure			*Recurrent Expenditure*
	Local	*Foreign*	*Total*	
	Rs.	*Rs.*	*Rs.*	*Rs.*
1966				
Tamankaduwa	2,108,000	7,824,000	9,932,000	1,847,872
Up-country	904,500	238,500	1,143,000	136,075
Under coconut	519,000	1,743,000	2,262,000	729,000
	3,531,500	9,805,500	13,337,000	
1967				
Tamankaduwa	1,054,000	3,912,000	4,966,000	2,771,808
Up-country	—	2,000,000	2,000,000	461,967
Under coconut	519,000	1,743,000	2,262,000	1,458,000
	1,573,000	7,655,000	9,228,000	
1968				
Tamankaduwa	1,054,000	3,912,000	4,966,000	3,695,744
Up-country	—	2,000,000	2,000,000	787,500
Under coconut	519,000	1,743,000	2,262,000	2,187,000
	1,573,000	7,655,000	9,228,000	
1969				
Tamankaduwa	—	—	—	3,695,744
Up-country	—	—	—	787,500
Under coconut	519,000	1,743,000	2,262,000	2,916,000
1970				
Tamankaduwa	—	—	—	3,695,744
Up-country	—	—	—	787,500
Under coconut	415,200	1,394,400	1,809,600	3,499,200

Summary of Total Capital Expenditure

	Local	*Foreign*	*Total*
	Rs.	*Rs.*	*Rs.*
1966	3,531,500	9,805,500	13,337,000
1967	1,573,000	7,655,000	9,228,000
1968	1,573,000	7,655,000	9,228,000
1969	519,000	1,743,000	2,262,000
1970	415,200	1,394,400	1,809,600
	7,611,700	28,252,900	35,864,600

ANNEXURE "G"

Employment Prospects on implementation of present proposals

Grade of employee

Year	Managers	Stock Inspectors (A.F.M.)	Conductors	F.A.A.	V.F.A.	Drivers	Tractor Operators	Watchers	Clerks	Labourers
1966	5	8	35	10	8	5	5	9	5	420
1967	2	5	23	4	5	2	2	4	2	240
1968	2	5	23	4	5	2	2	4	2	240
1969	—	—	15	—	—	—	—	—	—	120
1970	—	—	15	—	—	—	—	—	—	96

ANNEXURE " H "

Present Herd Strength at the Tamankaduwa Livestock Project and the Bopatalawa and Ambawela Farms

Farm	Breed	Stud Bulls	Draught Bulls	Cows	Heifers	Bull calves	Total	
Ambawela	**Ayrshire**	19	—	393	433	192	1,037	
	Jerseys	25	—	—	463	—	488	
								1,525
Bopatalawa	**Friesians**	18	—	232	166	110	526	
	Jerseys	7	—	86	55	31	179	
	Dairy Shorthorn	5	—	47	41	22	115	
	Red Poll	—	—	5	3	6	14	
	Friesian grades	—	—	224	197	37	458	
								1,292
Tamankaduwa	**Sindhi**	38	6	1,058	1,006	467	2,575	
	Tharparkar	10	1	176	182	105	474	
	Jersey	19	—	—	—	—	19	
	Crossbreds	—	7	281	839	484	1,611	
	Sinhala	—	—	1,318*	660	102	2,080	
								6,759
		141	14	3,820	4,045	1,556		9,576

* not milked.

MEMORANDUM ON MILK PRODUCTION

Explanatory Notes

1. **Credit Facilities.** The credit facilities to the private sector for the production of milk will be determined broadly on the following basis :—

(*a*) Value of investment ;
(*b*) Location and extent of land ;
(*c*) Extent and nature of pasture and fodder areas ;
(*d*) Number of technical personnel employed ;
(*e*) Facilities for marketing milk ;
(*f*) Value of imports involving foreign exchange.

The Department of Agriculture will recommend to the Bank the nature and extent of loans to be granted. We understand from the People's Bank that they already have a scheme of granting loans up to Rs. 100,000 per applicant for Animal Husbandry Projects.

2. **Percentage of Cows in Milk.** In this memorandum 70 per cent. of the adult cow population was estimated to be in milk at any time of the year on the basis of the results obtained at the Buffalo Farm, Ridiyagama which are shown below :—

Statistics of Buffalo Farm, Ridiyagama

	1961–62		*1962–63*		*1963–64*	
	No. of cows in milk	*Total No. of cows*	*No. of cows in milk*	*Total No. of cows*	*No. of cows in milk*	*Total No. of cows*
	223	356	236	398	269	444
	244	357	267	400	294	451
	257	360	289	401	315	451
	—	—	294	400	318	450
	267	371	293	399	327	449
	286	372	303	401	337	447
	288	369	310	402	335	450
	279	367	298	400	322	449
	279	367	289	396	302	445
	241	289	261	384	276	438
	286	350	267	372	249	412
	—	—	210	356	208	398
Average	265	356	276	392	296	440
Percentage in milk :	74		70		67	

The average percentage of adult cows in milk = 70 for the period 1961–62 to 1963–64

3. Size of Units. The milking parlour has been designed for milking 250 cows at any one time. The responsibilities of the staff have been arranged in such a way that a manager will be in charge of 1,000 animals, a stock inspector in charge of 500 animals and a conductor in charge of 250 animals. This will be the basis for the management of cattle and buffaloes at the Central Livestock Research Station, Polonnaruwa and the Livestock Project, Tamankaduwa, as it will also ensure the maximum utilization of each milking parlour.

4. Dimensions of Food Stores. The dimensions of the cattle food store are 50′ × 20′ × 18′. This building will be capable of storing 2 months feed requirements, which amounts to 3,682 bags. Details are given below :

Annual requirements of concentrates	22,095 cwts.
Therefore requirements for 2 months in 1 cwt. bags	3,682 bags
Storage space required	11,046 cu. ft.
Proposed dimensions of store	50′×20′×18′
Storage capacity	18,000 cu. ft.
Cost of building at Rs. 15 per sq. ft.	Rs. 15,000

5. Levels of Concentrate Feeding. The feeding of concentrates will be done as follows :—

(*a*) Milking cows : Maintenance requirements will be met by grass. Production will be met by feeding ½ lb. concentrate per pint of milk. A cow producing 10 pints of milk daily will receive 5 lbs. of concentrates.

(*b*) Dry cows that are pregnant will receive 4 lbs. of concentrates a day.

(c) Heifer calves will receive 2 lbs. of concentrates a day.

6. Feed Composition and Price. The recommended concentrate ration is made up as follows :

	Per cent.
Coconut meal	65
Rice bran No. 1	10
Rice bran No. 2	10
Wheat flour	5
Gingelly cake	7
Mineral mixture	3

This contains Proteins 18.6 per cent, Fat 5.5 per cent, Fibre 11 per cent and Moisture 9.3 per cent.

Prices of feed stuffs :	*Rs.*
1 Ton of milk max	295
1 Ton of Dairy Max	220
1 Ton calf pencils A	[illegible]
do. B	330
1 Ton mineral mixture	600
Feed Ingredients :	
1 Ton coconut meal	340
1 Ton extracts coconut meal	240
1 Ton rice bran No. 1	260
1 Ton gingelly cake	550
1 Ton mineral mixture	600
1 Ton wheat flour	Not available
1 Ton fish meal	1,140

7. Growth Rates of Buffaloes. The growth pattern of the average buffalo is as follows :

Age	*Weight lbs.*
At Birth	70
At 2 weeks	90
At 8 weeks	150
At 26 weeks	300
At 52 weeks	550
At 3 years	1,250

8. Veterinary Services. The control and prevention of animal diseases is governed by Contagious Diseases (Animals) Ordinance and the regulations framed thereunder. Under these regulations there is provision for the control of the import of animals with a view to preventing the entry of exotic animal diseases into Ceylon, and for the control of the movement of animals within the country so as to check the spread of enzootic diseases. The Ordinance is worked by the Chief Veterinary Surgeon, under the direction of the Deputy Director (Animal Production and Health), through a Field Veterinary Service.

For the purposes of animal disease control, the island is divided, at present, into 48 ranges, each manned by a Veterinary Surgeon. Each Veterinary Surgeon maintains a Veterinary dispensary at which advice on feeding, management and treatment of livestock is given free of charge. In addition, veterinary surgeons have a total of 120 field assistants attached to them. These officers undertake free immunization of livestock and poultry against the diseases prevelant in the area. All the vaccines required for the immunization of livestock against the contagious diseases prevelant in Ceylon are produced in sufficient quantity by the Veterinary Laboratory at Peradeniya.

Practice of Veterinary Medicine in Ceylon is governed by the Veterinary Surgeons and Practitioners Act of 1956. There are 140 Veterinarians qualified to practice veterinary medicine under this Act. The Faculty of Agriculture and Veterinary Science of the University of Ceylon, which was established in 1948, has over 50 veterinary students on its rolls, studying for a Bachelors' Degree in Veterinary Science. This Faculty has facilities for taking in 20 veterinary students per year.

Field Assistants attached to Veterinary Surgeons are selected from among candidates who have passed the General Certificate of Education Examination and have, in addition, undergone a course of training at a Practical Farm School. At present there are 20 such schools, of which 15 are for boys, with total student capacity of 915.

Artificial Insemination. Artificial Insemination was first introduced in 1950 at Peradeniya and this service has been gradually expanded. At present there are 3 semen collecting centres which serve the public through 33 sub centres, in charge of range veterinary surgeons. Inseminations are done at a nominal fee of Re. 1 per insemination plus cost of travelling by field assistants who have been specially trained in this work. In 1964, 8,500 animals were inseminated. With a view to expanding this service, the assistance of an F. A. O. Expert has been obtained. This expert, who is on a six month assignment, arrived in the Island last month.

Hand in hand with the Artificial insemination service, range veterinary officers undertake castration of scrub bulls. Authority for this procedure has been incorporated in the regulations framed under the Animals Act No. 29 of 1958.

Development Programme of the National Milk Board

21

EXISTING PATTERN

The Milk Board was established in 1954. The Board's functions as described in the Act was to "establish and maintain efficient and cheap production of milk and marketing services and to promote the establishment and maintenance of such services by local authorities and by other bodies and persons approved by the Minister for the purpose of ensuring that an adequate supply of milk of good quality at reasonable prices is available to consumers of milk in Ceylon". The Board has up to now concentrated its activities on the collection and marketing of milk whilst the production of milk has been handled by the Department of Agriculture.

The capital of the Board has been provided both by means of foreign aid and from government grants. The Board has received, in all, government grants totalling Rs. 9.7 million and foreign aid totalling Rs. 2.1 million approximately.

The Board is at present actively engaged in collecting milk from producers, processing, manufacturing by-products and distributing finished products. The Board is also at present importing and distributing infant milk powder under the brand name "Vitamilk". The Board has four processing centres and 12 collecting centres. The four processing centres are located at Colombo, Polgahawela, Kundasale and Galle. The processing centre at Galle had been converted to a collecting centre in view of the inadequacy of milk in that area. Steps have been taken to re-open this centre as a processing centre. Colombo centre has a pasteurising plant with a capacity of processing 50,000 pints of milk per 8 hour shift per day and a sterilising plant with a capacity of processing 8,000 pints per 8 hour shift per day. Both Kundasale and Polgahawela have pasteurising plants each with a capacity of processing 16,000 pints of milk per 8 hour shift per day. In addition to the processing of milk, Colombo factory also produces butter, cream, ice cream, milk pops, etc. whilst the collecting centre at Nattandiya manufactures curd. The collecting centres of the Board are located as follows :—

	Capacity of farm tank installed (Pints)	
Nattandiya	2,800	
Kotagala	11,800	
Kurunegala	2,800	
Minuwangoda	2,800	
Ampitiya	—	(only rotofreezers installed)
Polonnaruwa	4,800	
Gampola	5,600	
Meepe	2,800	
Chilaw	1,400	
Balangoda	2,800	
Meepilimana	—	(a farm tank is being installed)
Bopatalawa	5,600	

The Board gets its supplies of milk from 3 sectors i. e. Government Farms, Co-operative Societies and private suppliers. The average purchase for a day is around 46,000 pints at present of which 29,000 comes from private suppliers, 13,000 from Government Farms and 4,000 from Co-operative Societies. Milk collected at the centres is transported in insulated road tankers to the 3 processing centres. Colombo processes 26,000 pints of pasteurised milk and 4,000 pints of sterilised milk on an average per day working an 8 hour shift whilst the processing centres at Polgahawela and Kundasale process 8,000 pints of pasteurised milk each per day working an 8 hour shift. The factory at Colombo also manufactures the following quantities of by-products per day :—

Butter	400 lbs.
Ice cream	40 gls.
Milk pops	8,000
Yoghurt	1,400 cups
Ice chocs	100

The Board has three sales outlets i. e. Government Hospitals, Milk Feeding Centres and private customers. The breakdown of the sales is given below :—

	Hospitals (Pints)	*M.F.CC. (Pints)*	*Private customers (Pints)*
Pasteurised milk	5,000	19,000	17,000
Sterilised milk	2,500	500	2,000

Apart from sales to hospitals and milk feeding centres, the major portion of the sales to the private sector is concentrated in Colombo. Sales in the outstations are negligible.

The Board has been incurring losses in the region of Rs. 1.5 million a year. The reason for the losses is due to two factors. One fact is that the Board has to work within two limits i. e. the price paid to the producers and the price charged from the consumer. The average price paid to the producer is around 30 cents whilst the average selling price is 45 cents per pint. The total cost to the Board for every pint of milk processed is approximately 55 cents. The Board is unable to adjust either the selling prices or the buying prices in view of the fact that the function of the Board is to ensure a reasonable price both to producers and to consumers of milk. The other factor that has contributed to the losses of the Board is under-utilisation of plants. It will be observed that the Board is working at present only up to 50% of the installed capacity. Although sufficient milk is available in the country to work the plants to their full capacities, the Board is restricted in doing so on account of the absence of a market for the finished product. Extensive advertising is being carried out towards this and the Board expects to step up the purchases of milk to around 60,000 pints per day in the near future. At this point, the Board expects to break even on the processing of milk.

Development Programme Envisaged

The development programme of the Board falls into the following broad categories :—

(*a*) One of the main problems with which the Board is confronted with is the marketing aspect of the Board's products. The under-utilisation of plants has been chiefly due to this reason. Of the Milk Board's present sales figure of 1,400,000 pints a month, nearly 800,000 are sold to hospitals and milk feeding centres and only 600,000 are sold to the general public. Of this 600,000, nearly 500,000 pints are sold in Colombo alone and only 100,000 are sold in the outstations. The Board plans to carry out an extensive advertising campaign by means of radio, press and propaganda vans in order to attract the rural population to buy more of the Milk Board products. It is the third aspect of the advertising campaign that the Board intends to follow vigorously in the coming years. For this purpose, the Board will require 12 propaganda vans and along with other ancillary equipment such as loudspeakers, deep-freezers, bottle coolers, etc. Once this advertising campaign gets into full swing, the Board expects to reach a sales target of about 60,000 pints a day at the end of the second year and 75,000 pints at the end of the fifth year. To handle this additional sales of milk, the Board will have to strengthen its existing fleet of lorries. A minimum of 14 lorries would be required for this purpose. The Board would also need an additional 600,000 bottles and 3,000 crates.

(b) The second problem with which the Board is confronted with is the collection and transport of milk over long distances to the processing centres as a result of which the Board incurs heavy expenditure on transport and also runs the risk of wastages and spoilages of milk due to handling and breakdown in transport services. The Board accordingly plans to divide Ceylon into 4 Zones viz :

1. Coconut triangle comprising chiefly of coconut growing areas in the Western and North Western provinces.
2. The tea triangle consisting of two sections—
   (i) area consisting of Central and Uva provinces,
   (ii) Sabaragamuwa province and part of Western province.
3. The tea cum coconut areas of the Southern province.
4. North Central province.

The milk from the coconut triangle will be processed at Polgahawela, and Colombo. The Board currently purchases around 16,000 pints of milk per day from the coconut areas. As against 38,000 pints of milk processed per day at Polgahawela and Colombo, there is sufficient milk in the coconut triangle to cover the deficit of 22,000 pints.

The milk from the main segment of the tea triangle i. e. Central and Uva provinces will be diverted to the existing pasteurising plant at Kundasale which has a capacity of 16,000 pints per 8 hour shift. However, in view of the fact that the present supply of milk in this area is around 30,000 pints a day and as there is still a vast potential not tapped yet by the the Board in this area, the Kundasale centre will not be able to process all this milk. In order to take in this surplus milk, the Board plans to install a second sterilising plant in this triangle with a capacity of 16,000 pints per 8 hour shift. In addition to this, it also plans to install a spray drying plant within this triangle with a capacity of 50,000 pints per day.

The milk from the second segment of the tea triangle will be diverted to the pasteurising centre at Balangoda. The pasteurising plant at this centre is not in operation at present and most of the parts have been dismantled and removed to other places. A new plant with a capacity of 8,000 pints per day will have to be installed at this centre. There is sufficient milk in this segment to meet the requirements.

The milk from the tea cum coconut triangle in the Southern province will be diverted to the processing centre at Galle. A pasteurising plant with a capacity of 8,000 pints has been installed at this centre. There is sufficient milk in this area to meet the requirements of this plant.

The milk from the North Central province will be diverted to the condensed milk factory which is to be opened at Polonnaruwa. Approximately 118,000 pints of Buffalo milk will be required per day for the condensed milk factory and, of this, nearly 17,000 pints of milk are available at present from suppliers as well as from the Government Farm in the area.

The Thamankaduwa Project is expected to yield 64,000 pints of Buffalo Milk after 5 years. This quantity will meet the entire requirements of butter fat of the Condensary and it will be necessary only to import skim milk powder to meet the deficit in SNF requirements. It may be noted that the 118,000 pints of Buffalo milk will besides meeting the entire requirements of butter fat and skim milk of the Condensary will give a surplus of butter fat to the extent of nearly 1 million lbs. a year which will be diverted to the production of butter.

In order to implement the above development plans of the Board, the Board requires the funds set out in the next two sections of this report.

Development Projects Approved and being Implemented

1. Condensed Milk Project, Polonnaruwa

The project envisages the production of 12½ million tins of condensed milk in Ceylon. By working 2 shifts, the production could be stepped up to 25 million tins which will meet the entire condensed milk demand in the island. The project has been set up in collaboration with the New Zealand Dairy Production and Marketing Board. The plant and machinery for the condensary is presently being assembled in New Zealand under the supervision of the New Zealand Dairy Production and Marketing Board and will be tested by them before installation in Ceylon. The production of condensed milk to meet the entire local demand, will, apart from taking in all the available milk in the North Central Province, eventually result in a saving of Foreign Exchange to the value of nineteen million rupees. If, on the other hand, the entire quantity of Butter Fat, Skim milk powder, sugar and cans have to be imported, there would yet be a foreign exchange saving of around Rs. 4 million a year. The factory is being set up at Polonnaruwa in view of the fact that a large scale dairy development project is being undertaken by the Department of Agriculture at Tamankaduwa which is in close proximity to the factory. In this scheme, it is envisaged that, in ten years' time, the Department of Agriculture will produce sufficient milk to meet the entire needs of the condensary. Whilst, at the beginning, the condensed milk factory has to use imported skim milk powder and butter fat, the imports will decrease gradually as the supply of milk from the Tamankaduwa project increases.

An agreement has been entered into with the New Zealand Dairy Prduction and Marketing Board for the import of skim milk powder and butter fat from New Zealand in decreasing quantities to supplement milk available locally for the condensary project. The capital expenditure required for this project is approximately Rs. 6,556,800.

The capital cost of the project will be met partly by aid received from the New Zealand Government and partly from grants received from the Ceylon Government. Rs. 1,350,000 is being gifted by the New Zealand Government for this project and the Ceylon Government will have to meet the balance Rs. 5,206,800.

The Board envisages a profit of approximately two and a half million rupees a year on a production and sale of twenty five million cans.

2. Sterilised milk project, Kundasale

A plant with a capacity of 400 gallons per hour or 16,000 pints per 8 hour shift per day is being installed at Kundasale. This plant is

intended to take in the surplus milk in the Tea Triangle and is also intended as a stand-by plant for the sterilised plant in Colombo which is nearly 8 years old.

The total capital required for this project is as follows :—

	Rs.
Plant and machinery	**647,000**
Buildings	**182,000**
Ancillary equipment	**753,000**
Installation	**83,250**
	1,665,250

Of this expenditure, the foreign exchange component will be in the region of Rs. 1 million. There will be no expenditure of land in view of the fact that the project is to be sited alongside the pasteurising plant at the Board's centre at Kundasale.

3. Second Pasteurising Plant for Colombo Factory

The existing pasteurising unit in the Colombo factory has a capacity of 50,000 pints per 8 hour shift per day. This plant is nearly 8 years old and, in addition to the age of the plant, the plant is now said to be obsolete and has other shortcomings. It is proposed to install a new plant having a capacity of 1,100 gallons per hour or 50,000 pints per 8 hour shift per day. This plant will be installed alongside the existing plant in the same building. The plant will cost Rs. 60,000. An order has been placed with the local Agents and the plant has since been received by them. Once this plant is installed, the existing plant will be kept as a stand-by plant.

Development Projects Envisaged, but not yet Approved

1. Spray Drying Project

The Spray Drying Project is also to be installed in the Tea Triangle but will be sited at a suitable point away from the sterilised milk project at Kundasale. This plant will take in all the excess milk in

the tea triangle and will convert this milk into spray dried full cream milk powder which will be packed and sold in Ceylon. The capacity of the plant to be installed is 50,000 pints per 8 hour shift per day yielding approximately 6,400 lbs. of dried whole milk powder. There is sufficient milk in the tea triangle to meet the entire requirements of this plant. The Department of Agriculture Farms at Ambawela and Bopatalawa aim at doubling the quantity of milk in the next five years. In addition, there is considerable amount of milk in the area which has not been tapped before due to lack of collecting centres. With an adequate amount of collecting centres and transport facilities, it will be possible to collect immediately the entire requirements for this plant.

The capital expenditure required for this project is Rs. 2.5 million made up as follows :—

	Rs.
Land and buildings	750,000
Plant and equipment	1,750,000
	2,500,000

Of this sum, approximately Rs. 1.7 million will be required by way of foreign exchange, the balance 7 lakhs being local expenditure.

Ceylon imported 11.8 million lbs. of full cream milk powder valued at Rs. 26.8 million in 1964. The spray drying project will yield approximately 2.4 million lbs. of full cream milk powder a year *resulting in a foreign exchange saving* of approximately Rs. 5 million.

2. Packing plant for the Spray Drying Project

No capital cost was originally included in the spray drying project for the packing of this milk powder as it was intended at that time to have the dried milk transported to Colombo and packed in the Vitamilk Repacking Factory. As the Vitamilk Repacking Project has since been abandoned, it will be necessary to have a packing plant installed alongside the spray drying project. Separate figures for repacking project is not available but on the basis of capital costs worked out for the Vitamilk repacking project, a capital expenditure of nearly Rs. 350,000 will be necessary. Some of the plant brought down from the Vitamilk repacking project are already available.

3. Opening of new collecting centres

In the tea triangle, it will be necessary to open at least 7 new collecting centres to collect all the milk required for the sterilised and spray drying projects. Centres will be situated at Kotmale, Pussellawa or Ramboda, Rikillagaskade, Haputale, Badulla, Passara and Diyagma. Pussellawa or Ramboda and Haputale will need at least two farm tanks and the other areas one farm tank each.

The following additional centres will also become necessary in the other areas :—

Kadawata
Mirigama
Dompe
Horana
Avissawella
Ratnapura
Akuressa
Baddegama
Beliatta

On an average, it costs around Rs. 40,000 for the putting up of a collecting centre including the cost of the farm tank. The total cost of setting up an additional 16 centres would be Rs. 640,000. In addition, approximately 60-100 five gallon cans are required for handling the milk for each farm tank. On this basis, 1,500 five gallon cans will also be required costing Rs. 230,000.

The transport of milk from the collecting centres to the processing centres has to be done in insulated road tankers. The Board has at present 5 such tankers. Additional tankers will be required as follows :—

3 tankers of 9,200 pints each
3 tankers of 6,400 pints each
3 tankers of 4,800 pints each

The total cost of these tankers inclusive of chasis will be Rs. 275,000.

4. Can making project for the condensary

The condensary will be requiring, if worked full capacity, 20 million cans a year. The major factor in the cost of the finished product is the cost of the can. In the project report, cost of can has been worked out to 17 cents. Even this is on the high side and if the condensary could have its own can making plant, it would be possible to bring down the cost of the can to approximately 11 cents. The capital cost of a can making plant is approximately Rs. 1 million made up as follows :—

	Rs.
Building	150,000
Plant & machinery	800,000

5. Vehicles, bottles and crates

The sales of milk over the past years show an increase of only 5 per cent every year in spite of heavy expenditure incurred by the Board in advertising. In the past years, advertising was mainly confined to the radio and press. The Board proposes to launch out an extensive advertising campaign by means of propaganda vans in order to educate the rural people on the importance and values of consuming milk. By this means, the Board will be able to have personal contacts with the rural population and the Board confidently expects that its sales would increase by at least 20 per cent. a year over the next 5 years. The propaganda vans required for this purpose will have to be equipped with loudspeakers, deep freezers and bottle coolers. A minimum of at least 12 vehicles would be required at the outset. The cost of these vehicles would be in the region of Rs. 600,000.

Along with the increase in sales of milk, the Board will have to strengthen its present fleet of vehicles by the addition of at least 14 more vehicles made up of one 5 tonner, three 3 tonners and ten 2 tonners. A sum of Rs. 350,000 would be required for the purchase of these vehicles.

In order to handle the excess milk that will be required to meet the increasing demand, the Board would require at least 600,000 more bottles and 6,000 crates over the next five years. A sum of Rs. 350,000 would required for this purpose. The total requirements for Vehicles, Bottles and Crates would therefore be Rs. 1,300,000 for the next five years.

Total of all Projects

Total cost of Project		Project	Local Costs	Foreign Exchange Component	Aid received	Money to be Found
Rs.			Rs.	Rs.	Rs.	Rs.
6,556,800	1.	Condensary	3,956,800	2,600,000	1,350,000	5,206,800
1,665,250	2.	Sterilised milk project	665,250	1,000,000	—	1,665,250
60,000	3.	Second Pasteurising Plant, Col. Factory	—	60,000	—	60,000
2,500,000	4.	Spray Drying Project	750,000	1,750,000	—	2,500,000
350,000	5.	Packing Plant—Spray Drying Project	250,000	100,000	—	350,000
950,000	6.	Can making plant for Condensary	150,000	800,000	—	950,000
640,000	7.	Opening of new collecting centres	320,000	320,000	—	640,000
213,000	8.	Purchase of insulated cans	—	213,000	—	213,000
285,000	9.	Insulated Road Tankers	185,000	100,000	—	285,000
1,300,000	10.	Vehicles, Bottles and Crates	200,000	1,100,000	—	1,300,000
14,520,050			6,477,050	8,043,000	1,350,000	13,170,050

Foreign exchange Savings Arising from new Projects

		Rs.
1.	Condensary	19,000,000
2.	Spray drying project	6,000,000
3.	Can making project	3,000,000
4.	Sterilised milk and other projects for the expansion of milk sales on the assumption that there would be a corresponsding drop in the consumption of full cream milk powder	2,000,000
		30,000,000

Meat and Egg Production

MEAT AND EGG PRODUCTION

The consumption of meat in Ceylon has been increasing during the past decade according to the figures released by the Central Bank on the basis of consumer surveys conducted by them and it is likely that this trend will prevail even in the future. The per capita consumption that was 5.42 lbs. in 1954 has risen to 18.5 lbs. in 1963. The corresponding figure for Western countries is much higher being about 152 lbs. In 1963 a Ceylonese ate, on an average, 6.8 lbs. of beef, 1.9 lbs. of mutton, 7 ozs. chicken and 9.2 lbs. of 'other meat.' The consumption of pig meat could not be determined as it was included under the category of 'other meat.' The comparable figures in United Kingdom are 53 lbs. beef, 23 lbs. mutton, 47 lbs. pig meat and 15 lbs. chicken. The quantity of the different types of meat consumed by a Ceylonese may therefore be recorded as small by these standards. There are indications that the dietary habits of the Ceylonese are changing in favour of a greater consumption of food of animal origin. This is especially noticeable among the higher income groups.

Draft legislation has been submitted for the establishment of a Meat Board to undertake all aspects of meat supply. This was recommended by an inter-departmental committee in the Agricultural Plan 1958. The quantity and value of imports of meat in 1964 is given in Annexure I and the Animals slaughtered for food for the past 10 years in Annexure II.

Beef

There are no special breeds of beef cattle in Ceylon. Beef is provided mainly by the Sinhala cattle grazing the jungles and the roadsides and by culled dairy cattle and draught bulls. The consumer demand has not been selective for particular 'cuts' so familiar in the Western hemisphere for which varying prices prevail. The consumer preference in Ceylon is mostly for 'lean meat' without bones. There have been no incentives for expansion although haphazard rearing of beef cattle has resulted in cheap prices. There is a likelihood that the number of animals slaughtered for meat may soon exceed the natural increase in cattle population by births. This can be further worsened by mortality resulting from disease. The solution is to increase the carcass weight of the animal. All characters of economic importance relating to beef production are poor in Sinhala cattle as they have remained an unselected population. The average liveweight of Sinhala cattle is about 300 lbs. and they reach maturity rather late in life when the animal is about 4 years of age. The dressing out percentage of Sinhala cattle is under 45, so that an animal of 300 lbs. liveweight will produce only 135 lbs. of dressed meat after slaughter. The need has now arisen in Ceylon for a breed of beef cattle with a high rate of growth, early maturity, good adult weight and high dressing percentage to meet the increasing demand for good quality beef. This type of beef should fetch a higher price to make it profitable to encourage investment on beef cattle breeding. The aim in a programme of improvement of this breed is to evolve an animal reaching a liveweight of above 500 lbs. in 3 years. Improvement can be effected by :

(1) importation of meat breeds that thrive under local conditions,

(2) cross-breeding Sinhala cattle with exotic meat or dual purpose breeds.

(1) The Department of Agriculture has not had experience with imported meat breeds of cattle because breeding for meat did not form a part of the animal husbandry policy of the Department. It was only very recently that for the first time 12 heifers and 2 bulls of the Aberdeen Angus breed were imported from Britain. There is every likelihood that these animals will thrive in the dry patnas of the Nuwara Eliya District. This breed is recognized as one of the best beef breeds in the World. These animals are capable of attaining a bodyweight of about 1000 lbs. under two years of age and have a high dressing out percentage of above 60. The performance of the Hereford, Charolaise and Beef Shorthorn breeds are also to be investigated under Ceylon conditions at a future date.

(2) (*a*) Breeds of beef cattle suited for hot climates have been evolved by cross-breeding temperate and Zebu cattle with the objective of combining the good carcass characters of the temperate breed with the heat tolerance and disease resistant factors of the Zebu cattle. The best known recent example is the Santa Gertrudis breed that was evolved in Texas containing 5/8th Shorthorn and 3/8th Brahman blood. Any Indian breed imported to U.S.A. was designated Brahman. Other less known crosses are the Brangus—5/8th Aberdeen Angus and 3/8th Brahman and, Charbray—a cross of Charolaise and the Brahman breeds.

The possibility of importing some of the Santa Gertrudis breed of cattle will also be considered for breeding in the dry zone to assess the heat tolerance and resistance to endemic diseases.

(b) The Department of Agriculture is also investigating the possibilities of cross-breeding Black Sinhala cows with Aberdeen Angus bulls by both natural and artificial methods to evolve a type of beef animal suited for the dry zone.

(c) Cross-breeding with dual purpose temperate breeds such as Illawara Dairy Shorthorn breed in the dry zone for meat and milk. This latter breed is available at Bopatalawa Cattle Farm and at present there are about 22 bull calves at the Bopatalawa Farm. The stud bulls could be used for cross-breeding on the Sinhala cows. Illawara Shorthorn × Sindhi crosses have been found to be thriving well under Tamankaduwa conditions and producing a reasonably high yield of milk and a good carcass. This breed may be used for cross-breeding in the dry zone. Cross-breeding with Indian breeds such as the Sindhi, Sahiwal and Tharparkar breeds to produce dual purpose animals meant for meat and draught. Sindhi and Tharparkar bulls are available in reasonably large numbers for immediate utilization in such a project for cross-breeding with Sinhala cows. At present there are 467 Sindhi and 105 Tharparkar bull calves at the Central Livestock Research Station Polonnaruwa. The offspring would be smaller than any of the other crossbreds mentioned above and also have a longer period of maturity and lower dressing percentage. However this programme offers the best prospects of effecting an improvement over a large area in the country. These animals are capable of thriving under low levels of management and feeding.

(d) The occasional use of beef bulls on improved dairy cows such as the 'Cape' and the temperate breeds. In such instances only the best beef breeds such as the Aberdeen Angus may be used. These crossbred calves are reared for beef. This system is quite profitable in European countries where beef prices are very high.

The villages in the Dry Zone afford the best pattern for the establishment of a 'modified' stud centre system, in that village life is centred around ancient irrigation tanks. The cattle graze in close proximity to the tanks. The large herds of such cattle in these villages multiply at present indiscriminately. Advantage could be taken of the above conditions to establish 'modified' stud centres for proper breeding of these animals towards a meat production programme. The idea behind a 'modified stud centre' is to base departmental stud bulls according to the number of cows and heifers of breeding age in any village and allow them free range service, taking care that all male animals in the herd are castrated. Authority for such action is already available under the Animals Act. This system is envisaged as the handling of these animals for artificial insemination is difficult. The selected villages will be afforded special attention in Veterinary and other advisory services now rendered by the Department.

The table below sets out the number of stud bulls proposed to be introduced each year and the anticipated progeny, and the capital and recurrent costs of this programme are shown in Annexure III.

Year	*Stud bulls*	*No. of cows expected to be served*	*No. of calves expected to be born at 70 per cent calving*	*No. of survivors at 15 per cent mortality*
1965–66	150	7,500	—	—
1966–67	300	22,500	5,250	4,463
1967–68	500	47,500	15,750	13,388
1968–69	500	72,500	50,750	43,138
1969–70	500	97,500	68,250	58,013
Therafter	—	97,500	68,250	58,013

As a preliminary step this scheme will be inaugurated with the existing dual purpose breeding stock now available on Government farms. Each unit envisaged is for the accommodation of 5 stud bulls which are capable of serving a female stock of 250 animals. In the subsequent years it may be necessary to import stud bulls of the typical meat breeds depending on the results of experiments which will be conducted at 3 regional stations, namely Maha Illuppallama, Tamankaduwa, and Rahangala. The type of breeds evolved at these research centres will form the nucleus for the development of the beef industry. Proposals are contained in this report for the establishment of these research centres. Sufficient land is available at Maha Illuppallama and Tamankaduwa but the extent of land at Rahangala is limited to 80 acres.

Rahangala Farm—will be used exclusively for purebred herds of European beef cattle, namely the Aberdeen Angus, Hereford, Charolaise and the Beef Shorthorn. There will be 25 heifers and 2 bulls respectively for each breed making a total of 100 cows and 8 bulls.

Maha Illuppallama—will maintain 100 cows and 8 bulls of the Charbray breed. They will be used for crossbreeding with 250 Sinhala cows.

Tamankaduwa Project—will maintain 200 cows and 16 bulls of the Santa Gertrudis, Brangus and Ongole breeds. They will be crossbred with 500 Sinhala cows.

Estimates in respect of these proposals are shown in Annexure IV.

Crown land may also be alienated to the private sector in Rahangala, Maha-Illuppallama and Tamankaduwa areas for breeding of beef animals as a commercial enterprise with a minimum of about 50 animals. They may also have to import the animals for a start. Incentives may be provided such as crown land on lease, credit facilities by organisations such as the People's Bank and tax concessions for a period of at least 5 years. The conditions for granting credit may be done in consultation with the Department of Agriculture to ensure that such money is utilised for the development of animal husbandry. The capital and recurrent expenditure in respect of a unit of 1,000 cows for beef are given in Annexure V.

Mutton

This classification includes the meat of goats and sheep for meat production. The consumer survey of the Central Bank conducted in 1963 revealed that the per capita consumption of mutton was 1.9 lbs. annually. Presuming that an average carcass weighed 30 lbs., this weight is equivalent to 678,093 animals. The figure appears to be high as compared to the sheep and goat population given in the Statistical Abstracts. Mutton forms the greatest proportion of the imports of meat. The quantity of mutton imported for the year 1964 is equivalent to 65,883 goats and sheep valued at Rs. 3,051,629. The target fixed for the next 5 years is to attain self-sufficiency to the extent of doing away with imports and effect a saving in foreign exchange. Mutton is the most expensive meat costing about Rs. 3 per lb. to the consumer because domestic production has been unable to meet the increasing demand. The consumer preference may be due to the fact that there are no religious prejudices prevailing against the consumption of mutton, unlike in the case of pork and beef.

Goat farming has to be undertaken scientifically as goats are reputed to cause grave destruction to natural vegetation under uncontrolled systems of management.

The Department of Agriculture will undertake to provide breeding material for the small-scale farmer. For this purpose 2 goat farms have been established at Kottukachchiya and Weerawila in the Puttalam and Hambantota districts respectively. These farms will be developed further in the future. A new farm will also be established at Mannar. Each farm will carry about 6,000 goats. The requirements of the large-scale farmer however will have to be met by imports. Scrub jungles in the dry zone are ideal for goat farming as goats prefer browsing to grazing. There is also the possibility of cultivating tree fodder which can produce a good yield. The indigenous goats and sheep have a small body size that can be improved by cross-breeding with exotic stock. The Department of Agriculture has imported a South Indian breed of mutton goats and a woolless breed of sheep called the "Wiltshire Horn" for this purpose. The preliminary results in goat breeding are encouraging. It probable that sheep may thrive in the dry patnas and other dry regions of Ceylon. Sheep have distinct meat breeds unlike mutton goats and it is therefore possible to produce a good carcass for mutton or lamb with greater profit. The prospects for sheep farming therefore appear to be favourable though this has not been undertaken commercially.

Annexure VI shows that starting with 1,000 she goats it is possible to produce about 2,500 surplus goats, comprising mainly of males, at the end of 5 years. On this basis 30 such units are capable of producing the number of goats and sheep that are being imported for mutton at present. The Department of Agriculture, in conjunction with the small-scale farmer, will be able to produce about half the requirements of the mutton imports. However the large-scale goat breeder has scope for production of the balance half with assistance such as foreign exchange for importing stock, tax concessions, crown land on lease, veterinary and advisory services of the Department of Agriculture and other assistance to encourage investment. We recommend that the import of 15,000 goats for breeding be permitted at the rate of Rs. 150 per goat costing Rs. 2,250,000. This can be distributed over 4 years so that the annual allocation is Rs. 562,500.

Pig Meat

Pigs are among the most efficient converters of feed into meat. The feed mainly used for fattening pigs is swill, which is the waste from hotels, eating houses, and other similar institutions. Hence pig farming could be done profitably in close proximity to towns where there is an abundance of swill and in areas where there are no religious prejudices against pig farming. Such a breeding tract lies along the coastal belt from Kalutara to Chilaw. At present, the Department of Agriculture has a large pig farm at Welisara to meet the above two objectives. This farm carries a stock of 500 breeding sows. Sows litter twice a year—and on an average 7 piglings could be reared to weaning age of eight months. On this basis the 500 sows could produce 7,000 piglings per year. Allowing for mortality and for farm replacements, 6,750 piglings could be issued per annum to breeders. If these 6,750 piglings are fattened for a period of six months, each pig would attain an average weight of 150 lbs. or a total liveweight of 9,040 cwts. As the dressing percentage of the pig is 80 per cent. this quantity would provide 7,332 cwts. of dressed meat.

If on the other hand, the female piglings issued, viz. around 3,000, annually, are used for breeding, they will produce 42,000 pigs for slaughter each year. The quantity of processed pig meat imported to the country in 1964 was 1,301 cwts. valued at Rs. 438,983.

To increase the per capita consumption of pig meat and to achieve self-sufficiency in pig products, it is proposed to issue to the private sector 3,000 female pigs for breeding and 42,000 piglings for fattening. Estimates of expenditure for establishing and maintaining a unit of 10 breeding sows and for a unit for fattening 50 piglings are given in Annexure VII.

To encourage the private sector to undertake pig farming in order to achieve the above targets, it is recommended that they be given incentives in the way of tax concessions, easy credit facilities from institutions such as the People's Bank, etc., foreign exchange quotas to cover import of breeding stock, and plant and machinery required for the processing of pig meat.

Broiler Meat

In the past nearly all the chicken meat in Ceylon was contributed by culled laying hens and cockerels of egg laying and dual purpose breeds. In recent years however the poultry industry has specialised into distinct egg and meat strains of birds. The modern meat chickens are referred to as broilers that are killed at about 8 to 12 weeks of age when they attain a liveweight of about 4 lbs. The dressed weight of such a bird is about 3 lbs. They have a high feed efficiency and could convert about 2 lbs. of high energy feed into 1 lb. of meat. This is probably the best conversion rate obtained for any class of livestock due to the large investments made on research in poultry nutrition. The carcas has a high proportion of meat to borne and fleshing is in desirable quarters such as the thighs and chest. The quality of the meat is much superior to that derived from culled birds. Commercial broiler production is usually done on a large scale as the profit derived from an individual bird is small. In developed countries the average broiler house had accommodation for about 10,000 birds but today even this number has doubled. The mortality is low being under 3 per cent. due to the early age of salughter. Best use has been made of automation for feeding and watering to reduce the cost of labour. It is therefore not surprising to find that chicken meat is about the cheapest, form of meat available in European countries. Commercial broiler production has recently commenced in Ceylon and is rapidly developing to meet the increasing demand. Already poultry franchise rights have been obtained by Ceylonese for some of the well-known strains of broiler parents in the world, such as Cobbs, Hybro, Ideal, Chunky, Viking Ghostley, Arbor Acres × Vantrees, Starbro, S. P. B. and Led Brest × Pilch but the supply of day-old commercial chicks cannot meet the demand at present. The Department of Agriculture has the grandparent stock of broiler from the Shaver Poultry Breeding farms. The return from broiler is small in comparison to other livestock. The aim is to increase the per capita consumption of chicken from the present level of 7 ozs. to 1 lb. within a period of 5 years. With the active participation of the private sector it is expected that 1,000,000 broilers will be produced in the year 1966. Presuming a mortality of 15 per cent. and a carcase weight of 3 lbs. per bird these broilers will produce 2,555,000 lbs. of meat. In the year 1970, there will be 2,600,000 broilers producing 6,630,000 lbs. of meat. Annexure VIII shows the amount of:

(a) broiler chicks that will be available both from the private and Government sectors,

(b) broiler and culled poultry meat available for the period 1966 to 1970. If the private sector falls short in the production of the expected number of broiler chicks, the Department of Agriculture will supply this quantity.

Poultry feed is a serious limiting factor to the expansion of the poultry industry. The difficulty is to obtain locally, adequate supplies of cheap grain. Cereals comprise a minimum of 50 per cent. of the feed in rations that are fed to broilers. If the broiler industry has to depend on imported grain, there will be an increasing loss of foreign exchange, unless it could be obtained as aid from countries with surplus grain. The country imported 7,973 cwts. of maize at a price of 1,495,654 rupees during the year 1964. Annexure IX shows the estimated value of maize required for the period 1966 to 1970.

The immediate expansion of the maize and sorghum cultivation programmes is a vital necessity. These grains are purchased under a guaranteed price of Rs. 19 per cwt. Efforts should be made to produce the entire requirements of maize locally for the increasing poultry population. A suggested formula in a broad sense is as follows:

Maize 50 per cent.

Fish meal 16 per cent. (presuming a protein content of 60 per cent.).

Rice bran 20 per cent. (Grade I).

Coconut meal 10 per cent.

Shell grit 2 per cent.

Bone meal 15 per cent.

Vitamin mineral 0.5 per cent.

Modern methods of milling have to be undertaken to obtain good quality rice bran. Vitamin mineral premixes may have to be imported. There is a possibility of obtaining sufficient fish meal when the modern plant of the Fisheries Department at Mutwal operates at full capacity of 20 tons per day.

Replacement of Present Stock

The replacement of brolier parent stock will have to be made yearly. These parent stocks have to be imported from foreign countries by the different franchise agents at an average cost of Rs. 8 per parent chick. The parent stock for the production of broiler chicks by the Government sector would be multiplied at the Central Poultry Research Station, Kundasale. The chart below shows the total requirements and value of Parent Stock to be imported.

Year	*Total parent stock*	*Stock to be imported by Private Sector*	*Value—Foreign Exchange*
			Rs.
1966	12,000	6,000	48,000
1967	15,555	7,777	62,216
1968	20,000	10,000	80,000
1969	24,000	12,000	96,000
1970	28,000	14,000	112,000
			398,216

The capital and recurrent expenditure and the revenue on a 30,000 broiler project is shown in Annexure X.

Incubators

The target of 2,600,000 broiler chicks for the year 1970 will have to be achieved by increasing the present incubator capacity from 500,000 to 900,000. The present incubator capacity is sufficient to replace only the layer population in the country.

The increase in the incubator capacity by 400,000 will increase the foreign exchange expenditure by Rs. 400,000.

Egg Production

Prior to 1952 large scale poultry production in Ceylon was not undertaken due to fear of epizootic diseases and religious sentiment. However, there has been a very marked improvement during the past few years largely due to the efforts of the Department of Agriculture and the active participation of private poultrymen. In 1959, about 30 million eggs costing about 4.5 million rupees were imported. From the year 1963 no eggs have been imported to this country thus attaining self-sufficiency. The per capita consumption of eggs for the year 1963 according to the consumer survey conducted by the Central Bank is 18.5 eggs. Out of a poultry population of 6,129,196 birds the actual layer strength was 2,001,000 birds. The total consumption of eggs would have been 197,957,760 eggs as the per capita consumption of eggs was 18.5 eggs. The average production per bird amounts to 99 eggs for the year 1963.

In setting out a target for the period 1966 to 1970 it is necessary to consider—

(*a*) the increase in egg consumption in the past years ;

(*b*) the increase in egg production as a result of the introduction of improved strains of poultry.

From the figures that are available it is seen that the consumption per person has risen from 7.3 eggs in the year 1946 to 18.5 eggs in 1963.

Since the dietary habits of the Ceylonese in respect of egg consumption has definitely changed, it is proposed to double the per capita egg consumption during the next 5 years without bringing about any increase in the out flow of foreign exchange. The figure of 37 eggs per person is far below the minimum requirements of 180 eggs per annum recommended by human nutritionists.

The rapid improvement of the poultry industry in the past was largely due to the issue of purebred strains of poultry. In addition the department intensified its efforts by educating the public on modern methods of poultry management. It is proposed to encourage the private franchise hatchery men who represent the following world reputed hybrid poultry such as Hy-Line, Babcock, Ideal, Ghostley, Shaver, Sykes, Honnegger, Thornber, Kimber, Demler and Sterling to produce sufficient day-old hybrid chicks out of the imported parent stock to replace the present layer population. At present, the follow up or advisory work done is quite inadequate due to a shortage of officers trained in poultry.

With the gradual replacement of the present layer flock with improved strains of poultry, it is possible to attain a national average of 150 eggs per bird annually as hybrids are capable of ataining high levels of production. The performance of the hybrids in Ceylon are comparable to that in their temperate homeland as there are no problems of adaptability. The size of the farm is also fast increasing. Many backyard farms have either closed down or expanded during the past few years. It is anticipated that an average farm will have about a 1,000 layers. The capital and recurrent expenditure are given in Annexure XI.

It is estimated that 50,000 parent birds will be imported annually at a cost of Rs. 8 per chick amounting to Rs. 400,000 annually. This number of parent birds are capable of producing 2 million pullets annually. The present incubator capacity in the Government and private sector is 500,000.

With increasing efficiency in poultry management in large stocks, it is hoped that the cost of production of eggs will be reduced. This will increase the rate of consumption in the country as eggs will be within the reach of the lower income groups.

The requirements of additional staff in respect of the projects discussed in this report will form the basis of a separate memorandum.

ANNEXURE I

Imports of Meat 1964

(*Source :* Customs Returns 1964)

	Quantity	*Value in Rs.*
Sheep and lamb (live)	8,216 ..	501,659
Goats and kids (live)	13,846 ..	844,477
Poultry (live) as day-old chicks	46,930 ..	241,336
Live animals including turtles chiefly for food	158 ..	7,245
Meat of bovine cattle (beef, veal)	579 cwt. ..	133,217
Meat of sheep or lambs (mutton, lamb)	2,204 „ ..	344,650
Poultry killed or dressed	382 „ ..	78,304
Game, fresh, frozen or refrigerated	8 „ ..	1,455
Meat—other (including meat of goats, and kids fresh, frozen or refrigerated)	7,982 „ ..	1,074,157
Bacon, ham and salted pork	906 „ ..	276,799
Smoked, dried or salted beef and veal	87 „ ..	15,862
Smoked, dried or salted meat	31 „ ..	7,501
Beef, tinned, potted or preserved	1,339 „ ..	295,001
Mutton, tinned, potted or preserved	1,552 „ ..	386,686
Ham and bacon, tinned or preserved	93 „ ..	33,918
Pig products tinned or preserved—other	392 „ ..	128,266
Meat and meat preparations in air-tight containers ..	76 „ ..	9,468
Meat extracts and preparations—not in air-tight containers of meat, N.E.S. (including natural sausage casings) ..	796 „ ..	758,465
		5,138,466

ANNEXURE II

Animals slaughtered for food

(*Source :* Statistical Abstracts of Ceylon 1964)

Year	*Neat cattle*	*Buffaloes*	*Sheep, goats*	*Pigs (swine)*
1954[2] ..	173,790 ..	209 ..	190,068 ..	15,579
1955[3] ..	174,845 ..	1,406 ..	193,439 ..	13,538
1956[4] ..	174,917 ..	2,013 ..	183,213 ..	20,281
1957 ..	186,505 ..	2,185 ..	168,115 ..	19,831
1958 ..	176,967 ..	5,418 ..	129,962 ..	16,349
1959 ..	172,049 ..	25,273 ..	145,497 ..	15,559
1960 ..	179,276 ..	466 ..	123,935 ..	12,908
1961 ..	181,946 ..	462 ..	125,453 ..	11,566
1962 ..	214,880 ..	697 ..	123,600 ..	16,101
1963[5] ..	157,326 ..	15,295 ..	109,831 ..	12,773

(2) Does not include figures for 149 Village Committees.

(3) Does not include figures for 49 Village Committees.

(4) Does not include figures for 44 Village Committees, 6 Town Councils, 2 Urban Councils and 1 Municipal Council.

(5) Provisional.

ANNEXURE III

Estimates of Capital and Recurrent Expenditure

Modified Stud Centre of 5 Bulls :

(The bulls will be made available under the Departments normal programme)

Capital Expenditure :

	Rs.
1. Cost of Stud Bull Shed for 5 animals— 20′ × 16′ at Rs. 5 per sq. ft.	1,600
2. Equipment etc.	250
	1,850

Recurrent Expenditure :

	Rs.
1. Wages of 2 labourers	2,880
2. Concentrate feed and straw	3,000
3. Incidentals	100
	5,980

Summary of Expenditure :

Year	*No.*	*Capital Expenditure*		*Recurrent Expenditure*
		Foreign Rs.	*Local Rs.*	*Rs.*
1965–66	30	—	55,500	179,400
1966–67	60	—	111,000	540,000
1967–68	100	—	185,000	1,141,600
1968–69	100	—	185,000	1,742,600
1969–70	100	—	185,000	2,343,600

When the scheme is fully implemented there will be 1950 stud bulls in use. On the assumption that each bull will serve 50 cows per year and that 70 per cent. of these cows will calve, 68,250 calves would be born per year. Allowing for 15 per cent. mortality up to 3 years of age there will be 58,013 animals produced. Each of these animals is expected to weigh 500 lbs. at 3 years of age and have a dressing out percentage of 50. Accordingly 58,013 animals will provide 14,503,250 lbs. of dressed meat. A similar number of indigenous animals of 300 lbs. body weight at 4 years of age will provide 7,831,755 pounds of meat at a dressing out percentage of 45. Thus the increase in terms of meat as a result of this scheme is 6,671,495 lbs. per year after the 5th year.

ANNEXURE IV

Capital and Recurrent Expenditure in respect of Research Stations for Beef Breeds

I. RAHANGALA

Capital Expenditure :	*Local* Rs. c.	*Foreign* Rs. c.
1. Cost of stock	—	480,000 00
2. Cattle sheds	21,500 00	3,500 00
3. Food Stores	3,150 00	350 00
4. Stud Bull Shed	2,750 00	250 00
5. Sick Bay	925 00	75 00
6. Tractor	—	10,000 00
7. Water service	5,000 00	15,000 00
8. Electricity	5,000 00	20,000 00
9. Equipment etc.	1,000 00	—
	39,325 00	529,175 00
10. Quarters :		
Farm Managers quarter (1)	20,000 00	5,000 00
Conductors quarters (2)	7,500 00	2,500 00
Field Assistants quarter (1)	3,750 00	1,250 00
Labourers quarters (10)	30,000 00	10,000 00
Watchers quarter (1) Tractor operator (1)	6,000 00	2,000 00
	67,250 00	20,750 00

	Rs. c.
Total Foreign costs	549,925 00
Total Local costs	106,575 00
Total capital expenditure	656,500 00

Recurrent Expenditure :	Rs. c.
1. Cattle Food	44,798 00
2. Fuel (500 gallons)	2,500 00
3. Drugs	1,000 00
4. Incidentals	1,000 00
	49,298 00

5. **Salaries :**

	Salary	C. L. A	S. L. A
	Rs. c.	Rs. c.	Rs. c.
Managers (2)	1,980 00	1,219 20	420 00
Conductors (2)	2,172 00	2,287 20	420 00
Field Assistant (1)	750 00	936 00	210 00
Labourers (10)	4,800 00	7,600 00	2,100 00
Watcher (1)	540 00	382 80	210 00
Tractor operator (1)	750 00	940 00	210 00
	10,992 00	13,365 20	3,570 00

	Rs. c.
Total Recurrent Expenditure ..	77,225 20

Phasing of Expenditure :

It is proposed to construct the necessary buildings in 1965–66 and to import the stock in 1966–67.

	Capital	Recurrent	Total
	Rs.	Rs.	Rs.
1965–66 ..	176,500	30,427	206,927
1966–67 ..	480,000	77,427	557,427

II. MAHA-ILLUPPALLAMA

(The details of capital and recurrent expenditure for this unit are identical with those listed above for Rahangala.)

	Rs. c.
Total Foreign Costs	549,925 00
Total Local Costs	106,575 00
Total capital expenditure	656,500 00
Total Recurrent Expenditure	77,225 00

Phasing of Expenditure :

It is proposed to construct the necessary buildings etc. in 1966–67 and import stock in 1967–68

	Capital	Recurrent	Total
	Rs.	Rs.	Rs.
1965–66 ..	—	—	—
1966–67 ..	176,500	30,427	205,927
1967–68 ..	480,000	77,427	557,427

III. TAMANKADUWA

Capital Expenditure :

	Local Rs. c.	Foreign Rs. c.
1. Cost of stock	—	960,000 00
2. Cattle sheds	43,000 00	7,000 00
3. Food stores	6,300 00	700 00
4. Stud Bull shed	5,500 00	500 00
5. Sick bay	1,850 00	150 00
6. Tractor	—	10,000 00
7. Water service	7,500 00	20,000 00
8. Electricity	5,000 00	20,000 00
9. Equipment etc.	2,000 00	—
	71,150 00	1,018,350 00

10. Quarters :		
Farm Manager (1)	20,000 00	5,000 00
Conductors (2)	7,500 00	2,500 00
Field Assistants (2)	7,500 00	2,500 00
Labourers (20)	60,000 00	20,000 00
Watcher (1) Tractor operator (1)	6,000 00	2,000 00
	101,000 00	32,000 00

Total Foreign costs	1,050,350 00
Total Local costs	172,150 00
Total capital expenditure	1,222,500 00

Recurrent Expenditure :

1. Cattle food	89,596 00
2. Fuel (3,000 gallons)	3,000 00
3. Drugs	2,000 00
4. Incidentals	2,000 00
	96,596 00

Salaries :

	Salary Rs. c.	C. L. A. Rs. c.	S. L. A. Rs. c.
Manager	1,980 00	1,219 00	420 00
Conductors	2,172 00	2,287 20	420 00
Field Assistants	1,500 00	1,872 00	420 00
Labourers	9,600 00	15,200 00	4,200 00
Watchers	540 00	382 80	210 00
Tractor operators	750 00	940 00	210 00
	16,542 00	21,901 20	5,880 00

	Rs. c.
Total Recurrent Expenditure	140,919 20

Phasing of Expenditure :

It is proposed to construct the necessary buildings in 1967–68 and import the stock in 1968–69.

	Capital Rs. c.	Recurrent Rs. c.	Total Rs. c.
1965-66	—	—	—
1966-67	262,500 00	49,323 20	311,823 20
1967–68	960,000 00	140,919 20	1,100,919 20

Summary of Expenditure for Research Stations for Beef Cattle at Rahangala, Maha-Illuppallama and Tamankaduwa

Year	Capital Expenditure		Recurrent Expenditure
	Foreign Rs. c.	Local Rs. c.	Rs. c.
1965–66	69,925 00	106,575 00	30,427 00
1966–67	549,925 00	106,575 00	107,854 00
1967–68	570,350 00	172,150 00	204,177 00
1968–69	960,000 00	—	248,773 00
1969–70	—	—	248,773 00
Total	2,150,200 00	385,300 00	

ANNEXURE V

Capital and Recurrent Expenditure in respect of a unit of 1,000 cows for beef

Capital Expenditure :	*Foreign* *Rs.*	*Local* *Rs.*
1. Cost of 1,000 local cows at Rs. 150 each	—	150,000
*2. Cost of 20 stud bulls at Rs. 2,500 each (Indian breed)	50,000	—
3. Stud bull shed 50′ × 16′ at Rs. 5 per sq. ft.	—	4,000
4. One cattle crush	—	1,000
5. Equipment etc.	—	1,000
	50,000	156,000
6. Buildings :		
Stock Inspectors quarters	2,000	8,000
10 Labour cottages	3,000	17,000
1 store room	—	2,000
	5,000	27,000

	Rs.
Total Foreign Expenditure	55,000
Total Local Expenditure	183,000
Total Capital Expenditure	238,000

---

*This estimate is based on the presumption that the stud bulls used will be of heavy tropical breeds, as the performance of traditional temperate beef breeds has not yet been tried under local conditions. However, if the private sector is interested in importing such animals, the following breeds are recommended for trial :—

(*a*) Brangus
(*b*) Santa Gertrudis
(*c*) Charbray.

It is anticipated that a stud of the above breeds will cost around Rs. 15,000.

Recurrent Expenditure :	*Rs.*
1. Salary of stock inspector	3,600
2. Salaries of 10 labourers at Rs. 120 per month each	14,400
3. Concentrates for stud bulls at Rs. 15 per cwt.	5,475
4. Mineral mixture at Rs. 30 per cwt.	12,000
5. Incidentals	1,000
	36,475

***Revenue* : (at end of 3rd year and each year thereafter) :**

At 70 per cent. calving, 1,000 cows will produce 700 calves. Allowing 15 per cent mortality up to 3 years age, the number of surviving calves is 595. Of them 20 per cent of the heifers will be necessary as replacement stock for culled cows. Therefore the total number of animals available for disposal is 395. 395 animals will provide 250 lbs. of dressed meat per animal. 200 culled cows (local) will provide 135 lbs. dressed meat per animal. Therefore the total quantity of dressed meat equals 98,750+27,000 lbs. Total revenue at Re. 1 per lb.=Rs. 125,750 per annum.

Summary

	Expenditure		*Revenue*
	Capital	*Recurrent*	
	Rs.	*Rs.*	*Rs.*
1st year	238,000	36,475	—
2nd year	—	36,475	—
3rd year	—	36,475	—
4th year	—	36,475	125,750
5th year	—	36,475	125,750

ANNEXURE VI

Estimate of Expenditure for 1,000 head of goats

	Foreign Rs.	Local Rs.
Capital Expenditure :		
1. Purchase of 1000 she goats at Rs. 150 each	150,000	—
2. Purchase of 30 stud goats at Rs. 200 each	6,000	—
*3. Housing for 2,000 goats at 8 sq.ft. per animal at Rs. 2 per sq. ft.	—	32,000
4. Clearing 10 acres for building at Rs. 150 per acre	—	1,500
5. Water service	5,000	5,000
6. Electricity	5,000	—
	166,000	38,500
7. Quarters :		
Manager	3,000	22,000
Two Field Assistants	2,000	13,000
10 Cottages at 2,000 each	—	20,000
Office and stores	—	2,000
	5,000	57,000

Total Foreign costs	171,000
Total Local costs	95,500
Total capital costs	266,500

* If permanent type of housing is provided it would cost around Rs. 5 per sq. ft.

Recurrent Expenditure :	Rs.
1 Manager	3,600
2 Field Assistants	3,792
10 Labourers at Rs. 120 per month	14,400
Incidentals	2,000
Drugs etc.	2,008
Connected sheds	2,000
	27,800

Revenue :

Calculating on the basis that 70 per cent of the breeding females will kid once every 7 months, and allowing for 10 per cent mortality both in young stock as well as adults, the increase in stock will be as follows :

	Breeding Females	***Young Females***	***Young Males***
1st year	**1,000**	**540**	**540**
2nd „	**1,440**	**778**	**778**
3rd „	**2,074**	**1,120**	**1,120**
4th „	**2,987**	**1,613**	**1,613**
5th „	**4,301**	**2,323**	**2,323**

Revenue by sale of males, which will weight 70 lbs. at 1 year of age, at Re. 1 per lb. live weight :

	Rs.
2nd year by sale of 540 males	**37,800**
3rd year by sale of 778 males	**54,460**
4th year by sale of 1,120 males	**88,400**
5th year by sale of 1,613 males	**112,910**
6th year by sale of 2,323 males	**162,610**

ANNEXURE VII

Capital and Recurrent Expenditure for a unit of 10 breeding sows

	Local Rs.
Capital Expenditure :	
1. Cost of 10 breeding sows at Rs. 150 each	1,500
2. Cost of boars at Rs. 200 each	200
3. Cost of housing at 48 sq. ft. per animal at Rs. 10 per sq. ft.	4,800
4. Equipment etc.	100
	6,600
Recurrent Expenditure :	
1. Concentrates at 5 lb. per sow at 12 cents per lb.	2,190
2. Incidentals, drugs, etc.	300
	2,490
Revenue :	
At 8 piglings per litter and two litters per year, 160 piglings at Rs. 30 per piglings	4,800

Capital and Recurrent Expenditure for a unit for fattening 50 piglings per year

	Rs.
Capital Expenditure :	
1. Cost fo 50 piglings at Rs. 30	1,500
2. Housing for 25 piglings 5 sq. ft. per pig at Rs. 5 per sq. ft.	625
3. Equipment and incidentals	100
	2,225
Recurrent Expenditure :	
1. Swill at 3 cents per lb. including transport at 6 lbs. per pig	3,285
2. Incidentals	50
	3,335
Revenue :	
50 pigs each 150 lbs. at 85 cents per lb.	6,375

ANNEXURE VIII

Proposed production of broilers

Year	*Enterprise*	*No. of broilers*	*Pounds of meat*	*Pounds of meat from culled birds*	*Total*	*Per capita consumption*
					Rs.	*oz.*
1966	Private Sector	500,000	2,550,000	*4,681,250	7,231,250	10·8
1967	Private Sector	700,000				
	Government Sector	700,000	3,570,000	4,681,250	8,251,250	12·4
1968	Private Sector	900,000				
	Government Sector	900,000	4,590,000	4,681,250	9,271,250	13·8
1969	Private Sector	1,100,000				
	Government Sector	1,100,000	5,610,000	4,681,250	10,291,250	15·8
1970	Private Sector	1,300,000				
	Government Sector	1,300,000	6,630,000	4,681,250	11,311,250	16

• Number of culled birds — 1,560,413.

ANNEXURE IX

Quantity and Value of Poultry Feed Ingredients to be imported for the period 1966–1970

Year	*Maize*	*Foreign Exchange*	*Fish meal*	*Foreign Exchange*	*Total Foreign Exchange*
	tons	*Rs.*	*tons*	*Rs.*	*Rs.*
1966	2,654	928,900	902	726,110	1,655,010
1967	3,673	1,285,550	1,249	1,005,445	2,290,995
1968	4,723	1,653,050	1,605	1,292,025	2,945,075
1969	5,758	2,015,300	1,958	1,576,190	3,591,490
1970	6,794	2,371,900	2,310	1,859,550	4,231,450

	Rs.
Price of maize per ton	350
Price of fish meal per ton	805

ANNEXURE X

Capital and Recurrent Expenditure for a 10,000 broiler house to produce 30,000 broilers per year

Capital Expenditure :	*Local* *Rs.*	*c.*		*Foreign* *Rs.*	*c.*
Poultry house including equipment for 10,000 broiler house ..	75,000	00	..	25,000	00
Managers bungalow (1)	20,000	00	..	5,000	00
Labour cottages—1 twin cottage fo 2 labourers ..	6,000	00	..	2,000	00
Water service	5,000	00	..	10,000	00

	Rs.	c.
Local expenditure	106,000	00
Foreign expenditure	42,000	00
Total ..	148,000	00

Recurrent Expenditure :	Rs.	c.
Cost of 34,000 day-old broiler chicks	34,000	00
Feed cost—3,214 cwts. at 40 per cwt.	128,560	00
Fuel	3,000	00
Drugs	3,000	00
Incidentals	3,000	00
	143,000	00
Wages—Manager (1)	3,600	00
Labourers (2)	2,880	00
	178,040	00

Yearly Revenue :	Rs.	c.
90,000 lbs. broiler meat at Rs. 2.50 per lb. ..	225,000	00
Profit ..	49,960	00

ANNEXURE XI

Capital and Recurrent Expenditure for a 1,000 layer unit

	Local	Foreign
Capital Expenditure :	*Rs. c.*	*Rs. c.*
Poultry house for 1,000 layers at Rs. 7.50 per layer	5,000 00	2,500 00
Brooder—Grower house	3,500 00	1,500 00
Labour cottage	3,000 00	1,000 00
Water service	500 00	500 00
Equipment	1,500 00	500 00
	13,500 00	6,000 00

Local expenditure	13,500 00
Foreign expenditure	6,000 00
	19,500 00

Recurrent Expenditure :	
Cost of producing 1,000 point of lay pullets at Rs. 8 per pullet	8,000 00
Cost of 5 tons of mash at Rs. 440 per ton	22,000 00
Fuel	100 00
Drugs	100 00
Incidentals	200 00
Wages—Labourer (1)	1,400 00
	31,800 00

Revenue :	
200,000 eggs calculated at 200 eggs per bird at 20 cents	40,000 00
Carcass value of 900 culled layers at the end of 1 year of lay	4,500 00
	44,500 00
Profit for a year	12,700 00

Agricultural Development Programmes in the Private (Non-peasant) Sector

AGRICULTURAL DEVELOPMENT PROGRAMMES IN THE PRIVATE (NON-PEASANT) SECTOR

THE Government has recently (August, 1965) taken a policy decision that while maintaining the principle of according predominant consideration to local villagers and the rural peasantry in the alienation of Crown land, there is a case at the present time for granting Crown land under suitable lease conditions to private individuals and Companies which come forward with capital and well-formulated plans for developing agrigulture in the field of domestic food production.

This decision has also been based on the fact that there is considerable land available for alienation, particularly in the Dry Zone areas of the Island and that such land cannot be brought under production for many years ahead by an exclusively peasant oriented alienation programme even at an accelerated pace.

Accordingly, steps are being taken to alienate Crown land for approved agricultural development programmes and projects in the private (non-peasant) sector on the following basis:—

(1) Suitable Crown lands will be leased out for periods not exceeding 25 years on nominal rents with the Government's option thereafter of renewal or of it being taken over on suitable compensation terms.

(2) The size of the holding will naturally vary with the resources of the applicant and the kind of agricultural activity that is proposed to be developed; but the lease holding will generally be of substantial extents ranging from about 25 to even 500 acres and a 1,000 acres.

(3) A Special Leases Board has been set up to consider the terms and conditions on which the land will be made available. This Board, which functions under the Ministry of Land, has representation from the Ministry of Agriculture, the Ministry of Finance and the Department of National Planning.

(4) The Special Leases Board will scrutinize applications, approve proposed agricultural projects and make recommendations regarding the release of foreign exchange for important necessary capital equipment, machinery, transport equipment, fertilizers, agro-chemicals etc., in accordance with the nature of the approved programme or project.

(5) Individuals and Companies proceeding to make investments in developing land for food production are to be given generous tax concessions.

As at present, one cannot forecast the impact of this policy on agricultural development because the scheme has barely got under way. The final date for submitting applications for special leases of land has been fixed for 15th October, 1965. On the information available, it would appear that applications have been received for about 15,000 acres of land. This may go up to 25,000 acres by the time of the closing date. The applicants appear to have shown a preference for the cultivation of subsidiary food crops and the development of livestock projects.

It is generally recognised that most subsidiary food crops are labour intensive and that if they have to be cultivated with hired labour, the economic returns may prove unattractive and even unfavourable. The successful cultivation of subsidiary food crops on large plantation scale will therefore depend largely on the prospects of applying machinery at most, if not all phases of cultivation and harvesting. In this respect Ceylon has little or no experience on which to assess the capital investment that must go into the machinery required for cultivating an acre of say, chillies, red onions or Bombay onions.

Similarly, the information available on the use of lift irrigation, particularly in respect of the capital costs of equipment, is negligible. The large scale cultivation of subsidiary food crops will not be a reality unless there is an assured supply of water. Large investors will therefore have to plan on the basis of securing water supplies by pumping from existing waterways or by securing new sources of underground water by means of tube wells.

On both counts therefore, namely, the import costs of machinery for cultivation of subsidiary food crops and the import costs of lift irrigation equipment, the present estimates of foreign and local expenditure can be only the most arbitrary. The preparation of more accurate estimates must necessarily await results of the first efforts that will be made in this field.

A separate division of the Irrigation Department has recently been established for undertaking lift irrigation works. A separate paper will be submitted to the Planning Department estimating the cost of providing lift irrigation facilities for the cultivation of subsidiary food crops in the peasant sector. However a similar estimate cannot be prepared immediately for the private sector because the scheme for special land leases has not started functioning yet.

It is expected that the private capitalist sector will provide 10,000 acres in subsidiary food crops during the five-year period 1966-70. No estimate can be provided at present of the capital reqirements for these schemes. The only specific request for machinery and lift irrigation equipment has been in respect of a 100-acre extent of land proposed to be cultivated in vegetables by Mr. de Glanville of Messrs. Carson Cumberbatch & Co., Ltd. This application which is based on estimates prepared by Messrs. Brown & Co., Ltd., estimates the cost of the irrigation equipment at approximately Rs. 48,000 for a unit area of 25 acres. The 100-acre farm will be irrigated by rotating this unit. In the same application, the requirement of tractors and other cultivation machinery has been estimated at approximately Rs. 54,000.

It is likely that investors in the private sector will also take to a variety of Animal Husbandry projects. In these cases, expenditure on the import of breeding-stock will be necessary. But here again no estimate can be given now.

Private sector investment will be organised either on the basis of direct investment and management or on the basis of " sponsorship schemes ", where private Companies will provide certain facilities to cultivators and undertake the purchase of the crop, as now happens in the case of the Tobacco Companies and tobacco growers.